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Official Journal of the Interstate Postgraduate Medical Association

Volume 23, Number 3 **MARCH 1958**

Postgraduate Medicine

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Cardiac Function in Clinical Practice . . . . . C. K. Friedberg

Urinary Tract Infections in Children . . . . . J. J. Cordonnier

Pelvic Pain . . . . . Langdon Parsons

Newer Treatment of Diabetes Mellitus . . . . . M. David Allweiss

Forearm Fractures . . . . . James K. Stack

Cytologic Technics for Office and Clinic . . . . Herbert E. Nieburgs
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Postgraduate Medicine

Volume 23 · Number 3

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WHEN BLOOD PRESSURE MUST COME DOWN

AS IN THIS CASE[1]: Fundus of 62-year-old female who has had severe hypertension for many years. Photo shows effect of pressure at a-v crossings and various types of hemorrhage.

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1. Bedell, A. J.: Clin. Symposia 9:135 (Sept.-Oct.) 1957. 2. Lee, R. E., Seligman, A. M., Goebel, D., Fulton, L. A., and Clark, M. A.: Ann. Int. Med. 44:456 (March) 1956.

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Your Questions answered

Readers may send questions from their own practice or other medical problems which will be answered by qualified consultants. Replies are forwarded by mail immediately and selected questions and answers are published each month in this section.

• ASIAN INFLUENZA VACCINE

Q. Would you consider giving an adult one dose of 0.1 cc. of Asian influenza vaccine intracutaneously to provide 70 per cent or more protection when he is exposed to Asian influenza virus? Will this dose provide protection for four months? Are there any field experiments or trials to substantiate the value of this method?

Since protection against a disease is not always parallel with the level of antibodies found in the laboratory, could any statement be made concerning the percentage of immunity without actual measurement when influenza strikes a group that has been immunized? The effectiveness of the Asian vaccine was determined by giving 1 cc. subcutaneously to a group of persons who were then exposed to the virus. The only method I know to measure the effectiveness of 0.1 cc. vaccine given intracutaneously is to measure antibodies by the hemagglutination technic.

Would you consider it to be proper and without danger to give more than one injection intracutaneously to different persons from the same syringe just by changing needles?

M.D.—Pennsylvania

A. There is no published evidence to substantiate a claim that 0.1 cc. of Asian influenza vaccine administered intracutaneously to an adult would provide 70 per cent or more protection on actual exposure to Asian influenza virus. There is not even evidence published to the effect that 1.0 cc. of such vaccine containing 200 C.C.A. units will protect at least 70 per cent of the population. Neither is there any field experiment or trial reported in literature on the results of the intracutaneous administration of this vaccine to adults.

No one knows how long Asian influenza vaccine will afford protection, because field trials of this nature have not been carried out and made public. In December 1957, Culver and associates published the first results of field experiments in adults, using 1.0 cc. of Asian influenza vaccine containing 250 C.C.A. units. They concluded that the point estimate of effectiveness was 43 per cent. However, these experiments were carried out under difficult circumstances, and the authors state that the rate of effectiveness actually may be higher. But because of the nature of the experiments, there is also the possibility that the rate of effectiveness might be lower.

In all available published material the effectiveness of Asian influenza vaccine was determined by the measurement of antibodies in the laboratory by the hemagglutination technic, with perhaps a few experiments having been carried out in which the determination was made by neutralization tests in mice. One set of experiments has been published in which persons vaccinated against the virus have been deliberately exposed to a culture of virus. However, it is difficult to translate these experiments into terms of natural infection.

It is hazardous to carry out mass inoculations using the same syringe, with changes of needles. In such a procedure the back pressure on the fluid within the syringe may result in contamination. This is particularly hazardous when the usual technic of drawing back on the plunger of the syringe is used to be sure the injection is not being made directly into a vein. The procedure of using a common syringe for mass inoculation should be heartily condemned.

(Continued on page A-24)

WHEN YOU TREAT INFECTIONS IN PATIENTS SUCH AS THESE

- debilitated
- elderly
- diabetics
- infants, especially prematures
- those on corticoids
- those who developed moniliasis on previous broad-spectrum therapy
- those on prolonged and/or high antibiotic dosage
- women—especially if pregnant or diabetic

the best broad-spectrum antibiotic to use is

MYSTECLIN-V

Squibb Tetracycline Phosphate Complex (Sumycin) and Nystatin (Mycostatin)

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for practical purposes, Mysteclin-V is sodium-free

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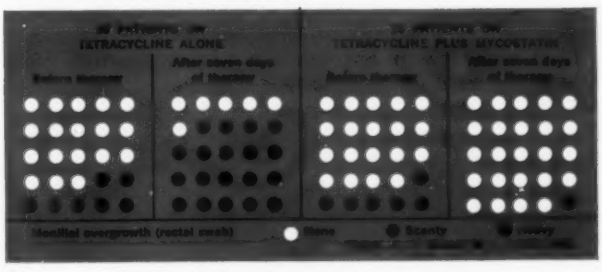

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• MASS IN ABDOMEN

Q. A 40 year old married minister has ascites and a large, hard mass in his abdomen. While vacationing in the West Indies in 1952, he had an episode of diarrhea. In April 1953, he noticed a mass in the right upper quadrant of his abdomen; other complaints at that time included indigestion, dyspnea, loss of weight, increasing weakness, and deterioration of general health. The diagnosis was carcinoma of the liver. The pathologic report of a liver biopsy done in July 1953 was metastatic papillary adenocarcinoma, suggesting primary cancer in the gallbladder. The mass grew rapidly; it extended to the pelvis and became harder, nodular and tender. The patient continued to lose weight and strength. However, during the summer of 1953, his digestion improved; his strength returned; and he was able to go back to his work, which he has carried on energetically for the past four years. Although the mass has remained in his abdomen, his digestion has been good and he has felt well.

Recently, ascites has greatly increased; paracentesis in October 1957 yielded 9,350 cc. of clear fluid, with a specific gravity of 1.094. The pathologic report revealed no malignant cells. Except for the mechanical weight, the patient feels quite well. He has been given DIAMOX® orally, THIOMERIN® intramuscularly, and vitamin B complex. I would appreciate any suggestions in regard to this case.

M.D.—Ontario

A. The course of disease in this patient is atypical of primary carcinoma of the gallbladder. It would be expected that if the tumor had invaded the gallbladder local extension to the common duct would have taken place causing jaundice. However, over a period of four years this apparently has not occurred, although in a large percentage of cases such tumors produce jaundice in a relatively short time. Interpretation of a needle biopsy of the liver may be difficult, and it is possible that the specimen simulated carcinoma by proliferation of bile duct cells.

The history of diarrhea following a vacation in the West Indies would lead one to suspect schistosomiasis with involvement of the liver and lungs. *Entamoeba histolytica* and echinococcus cyst, both of which cause hepatomegalia, should also be considered. The clinical course with initial disability and later improvement despite the chronically enlarged liver makes this a more likely diagnosis. A small percentage of schistosomal infections of the liver produces cirrhosis; this might have been a massive involvement with eventual fibrotic change, portal hypertension and ascites. Liver function tests are not mentioned, and it is assumed that there is no evidence of metastatic disease elsewhere.

The diagnosis of schistosomiasis might be confirmed by sigmoidostomy and biopsy of the mucosa where ova are found commonly in patients who are chronically infested. A second biopsy of the liver might reveal either schistosome ova within the liver or cirrhosis, or help to clarify the original diagnosis of carcinoma.

Metastases to the liver from another site in the gastrointestinal tract, such as the pancreas, is a further possibility. These tumors may invade the liver early but be very slow in growth. An x-ray survey of the gastrointestinal tract as well as a secretin test following duodenal intubation might be revealing. If there has been schistosome invasion of the liver with subsequent cirrhosis, the treatment is that followed in any cirrhotic process. If a metastatic or primary carcinoma is present, it is doubtful if any measures would be of permanent help.

• RUPTURED CHORDAE TENDINEAE

Q. I would like information on the cause, subjective and objective symptoms, and the prognosis of ruptured chordae tendineae cordis. Is there any treatment for this condition? Evidently there is a scarcity of literature on it. Please refer me to a number of pertinent articles.

M.D.—Connecticut

A. Ruptured chordae tendineae apparently occurs most frequently in patients with subacute bacterial endocarditis, mitral stenosis or marked mitral insufficiency. The only case that I have seen in 40 years of experience with cardiovascular disease was in 1941 in a patient with rheumatic mitral stenosis. Congestive heart-failure with death followed a week after the ruptured chordae tendineae occurred. The diagnosis was made at autopsy.

References to this condition may be found in "Heart Disease," by Dr. P. D. White, published by The Macmillan Company, and "Diseases of the Heart," by Dr. C. K. Friedberg, published by W. B. Saunders Company.

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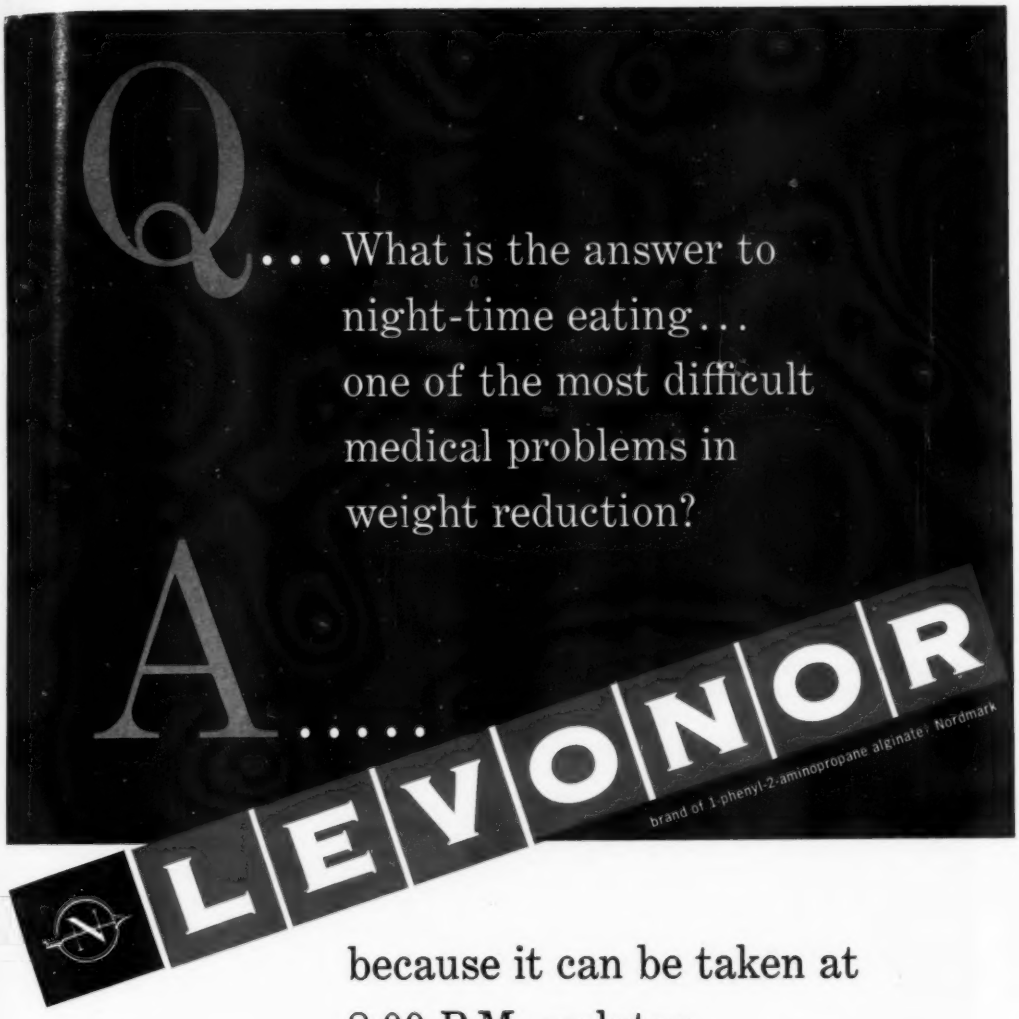
Q
. . . What is the answer to night-time eating . . . one of the most difficult medical problems in weight reduction?
A . . . . .
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how supplied:
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1. Sc. Exhibit, N. Y. State Med. Meeting, Feb. 18-21, 1957.

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• INSECTICIDE POISONING

Q. We have many patients intoxicated with Folidol and GAMMEXANE® (insecticides used by farmers). What is the recommended treatment?

M.D.—Peru

A. The pure gamma isomer of hexachlorocyclohexane is used in medicine under the name of gamma benzene hexachloride (Gammexane) and in agriculture as Lindane. It resembles DDT® in all its actions on insects and vertebrates. It may be fatal to man by inhalation of the dust, since it is a convulsant. There is no specific antidote to supplement the general treatment which is: (1) emesis and gastric lavage if poison has been taken internally, (2) evacuation of the intestine by saline cathartics, (3) thorough washing of the eyes or body if there has been external contact with the poison, and (4) sedatives, in the form of rapidly acting barbiturate.

I can find no reference to Folidol. The treatment would supposedly be the same as in any case of poisoning where the nature of the toxic agent is not known and is symptomatic. This includes: (1) emesis and lavage, (2) saline cathartics, and (3) washing of eyes or body.

• PROETZ TREATMENT

Q. I would appreciate information on the technic, drugs used, indications for and the results to be expected from the Proetz treatment for sinus infection.

M.D.—Michigan

A. The Proetz displacement irrigation is a method by which air can be removed from the sinuses and can be replaced by fluid. The patient lies supine, with the head low enough so that the nose and nasopharynx are below the level of the glottis and esophageal introitus. The nose is filled with fluid; and, by interrupted suction, the air is withdrawn from the sinuses, an action which allows the fluid to replace the air. More fluid is dropped into the nose periodically as required.

The fluid used may be an isotonic solution of sodium chloride, a solution of penicillin, or, if special roentgenograms of the sinuses are desired, a radiopaque solution.

Many patients report symptomatic relief from this treatment; however, spreading of infection to uninvolved sinuses and acute otitis media have been reported to follow this procedure.

(Continued on page A-29)

the first Meprobamate-Prednisolone therapy for
Lumbago
relieves muscle spasm and inflammation
IN MILD INVOLVEMENT
MEPROLONE® 1
IN MODERATELY SEVERE INVOLVEMENT
MEPROLONE® 2
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A wide range of mild or moderately severe rheumatic-arthritic conditions show exceptional response to the anti-inflammatory, muscle-relaxant, calming action of MEPROLONE-1 or MEPROLONE-2. Also available is MEPROLONE-5 for severe involvement when higher doses of prednisolone and meprobamate are required.
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• **LEG ULCERS**

Q. What is the best treatment for indolent varicose vein and postphlebitic leg ulcers? I would like information concerning surgical treatment, the facilities and surgical experience considered necessary, and the best medical treatment.

M.D.—Manitoba

A. Almost all ulcers of the leg that are secondary to varicose veins and the postphlebitic syndrome will heal if the patient is kept continuously in bed with the leg elevated to an angle of 30 degrees from the horizontal so that the ulcer-bearing area is several inches above the level of the heart. Local treatment of the ulcer is of secondary importance, but it is usually advisable to keep it moist with continuous wet dressings of either warm boric acid solution, 0.5 per cent aluminum subacetate solution or 1 per cent sodium chloride solution. The use of ointments, antibiotics or preparations containing any strong medications that might cause irritation of the skin in sensitive individuals is undesirable.

This treatment alone almost always results in the healing within three weeks of stasis ulcers less than an inch in diameter. If an ulcer is larger, healing is usually hastened by skin grafting after the ulcer has been cleaned by elevation of the leg and by treatment with wet dressings of boric acid, and after the base of the ulcer is covered with granulation tissue. Split-thickness skin grafts are preferable to full-thickness grafts, and application of the skin grafts by the so-called postage-stamp technic is probably superior.

Preventing a recurrence of stasis ulcers is more difficult than healing them. If large varicose veins with incompetency of the valves in either the greater or lesser saphenous system or both are present, surgical removal of the veins is desirable when no contraindications to such treatment exist. Whether or not varicose veins are removed surgically, it is almost always desirable for the patient to wear one or more elastic bandages or an elastic stocking of sufficient tensile strength to prevent orthostatic edema. In addition, it is often helpful for the patient to wear a foam-rubber pad that is beveled at the edges, about 1.5 cm. thick in the middle, and large enough in diameter to overlap by 1 or 2 cm. the margins of the ulcer scar. The elastic support should be applied over this foam-rubber pad. Patients should try to prevent injury to the leg, since many ulcers are initiated by contusions or other minor injuries.

How to

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Supplied: Tincture 1:1000 tinted, tincture 1:1000 stainless, and aqueous solution 1:1000 in 8 oz. and 1 gal. bottles. Concentrate (12.8% buffered aqueous solution) in 4 oz. and 1 gal. bottles.

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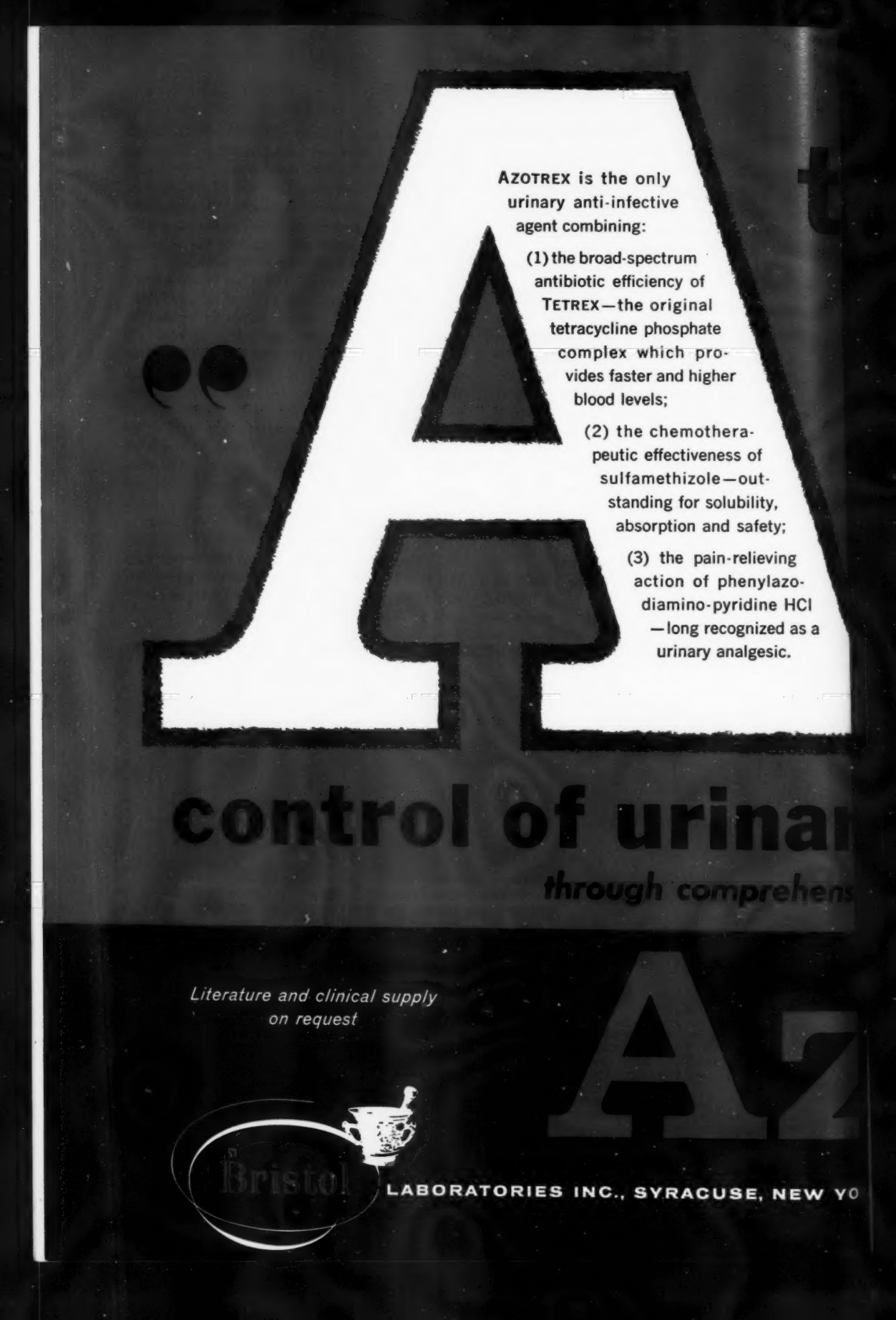
AZOTREX is the only urinary anti-infective agent combining:
(1) the broad-spectrum antibiotic efficiency of TETREX—the original tetracycline phosphate complex which provides faster and higher blood levels;
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What's happening in Medicine

POSTGRADUATE MEDICINE'S REPORT of late news of interest to practicing physicians

PREGANGRENE REVERSAL IN ISCHEMIC LIMB

Twenty-fifth annual meeting of the American Academy of Orthopaedic Surgeons:

• Treatment with arterial grafts has resulted in preservation of ischemic legs in 50 patients admitted over a four year period to the Cleveland Clinic Hospital. Thirty-five were restored to useful viability and have remained so; 31 of these have been symptom-free. Results in only 12 patients were unsatisfactory: Ten lost their legs and two died of their primary disease. The salvage rate was 75 per cent. A comparable series of 37 consecutive sympathectomies done for the same complaint showed a salvage rate of 49 per cent. Of the 18 surviving limbs, however, only five were symptom-free.—Dr. A. W. Humphries, Chagrin Falls, Ohio.

• A follow-up has been made on 48 patients whose hips had been subjected to arthroplastic procedures for rheumatoid arthritis. Results were classed as "good" in 32. The patients accomplished a degree of ambulation not present prior to surgery and were relieved of pain for average use of their legs.—Dr. J. R. Schwartzmann, Tucson.

• Analysis of the synovial fluid has been found to aid in the differential diagnosis of joint disease in puzzling cases. It consists of determination of the mucin content by acetic acid preparation, the difference of the serum sugar and synovial fluid sugar levels, and the total leukocyte count and differential.—Dr. J. George Furey III, Cleveland.

NEW CLASS OF ANTIPSYCHOGENIC AGENTS

Scientific conference of the Brain Research Foundation:

• A number of structurally related agents which have been synthesized act as antagonists to the very powerful psychogens when they are administered prophylactically. These antagonists have shown promise in blocking visual and auditory hallucinations produced by the psychogens in human volunteers. Some of the most effective ones are now receiving clinical trials in psychotic and in psychomotor epileptic patients.—Leo G. Abood, Ph.D., University of Illinois College of Medicine, Chicago.

TITANIUM PROSTHESIS FOR FINGER JOINTS

American Society for Surgery of the Hand:

• A titanium prosthesis fashioned into a replica of the normal joint has been used to replace irreparably damaged finger joints in 14 patients, thus preventing amputation. The prosthesis can be made in various sizes.—Lieutenant Colonel Earl W. Brannon, Lackland Air Force Base Hospital, Texas.

WHO DIES OF ASTHMA?

Fourteenth annual meeting of the American Academy of Allergy:

- A review of records of all patients who died of asthma at the Massachusetts General Hospital between 1928 and 1957 shows that the middle-aged intrinsic asthmatic patient whose asthma continues at a moderately severe level for about a month represents a potential fatality. Although findings suggesting death is near are not presented, apathy, shallow and rapid breathing, decreased air exchange and unyielding peripheral vascular collapse are ominous developments.—Dr. Claribel Westermeyer, Boston.
- Growth retardation occurred in 9 of 10 asthmatic children receiving prednisone for 10 to 22 months at the pediatric allergy clinic of The Johns Hopkins Hospital. Average daily dose for each patient was 5.0 to 12.9 (mean 6.97) mg. per square meter. Growth rate was reduced up to 15 per cent of normal in five and 30 per cent of normal in four.—Dr. Thomas E. Van Metre, Jr., Baltimore.
- Steroids applied topically in small amounts as an aerosol to the bronchial tree have been found to control asthma effectively with much less risk of the undesirable consequences of steroid therapy. The aerosol is administered so that the amount inhaled is less than would have been expected to be effective if absorbed systemically.—Dr. William Franklin, Boston.

KIDNEY IS ERYTHROPOIETIN SOURCE

Accumulated evidence suggests that the kidney may be a site of erythropoietin production. In completely nephrectomized animals, stimulation failed to exhibit an increase in erythropoietin. On the other hand, in animals with intact kidneys, administration of cobalt or induction of a massive hemorrhage accelerated the release of the hormone.—Dr. Leon O. Jacobson, Argonne Cancer Research Hospital, Chicago, before the Seventh Annual Blood Symposium, Wayne University, Detroit.

EXPLORATORY THORACOTOMIES ADVOCATED

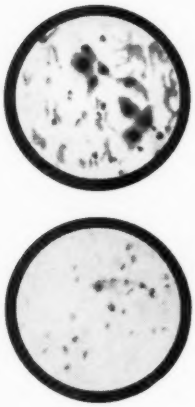
Presence of x-ray shadows of unknown origin demands exploratory thoracotomy. Following this procedure in nine such patients who had no symptoms, diagnosis was made of bronchogenic carcinoma. After lung resection, five are alive today, more than four years later.—Dr. R. A. Daniel, Vanderbilt University, Nashville, before the Southern Thoracic Surgical Association.

AORTIC GRAFT FOR CANCER

Following surgical operation, an aortic graft has been used successfully in two cancer patients to help restore the esophagus. The graft may be used as either an intact tube to replace the esophagus and to form a scaffold for new tissue growth or a patch, depending on how much of the esophagus has been removed.—Dr. Joel Pressman, University of California at Los Angeles, before a sectional meeting, American College of Surgeons.

BACK EXAMS FOR ADOLESCENTS URGED

All boys should have low back examinations during adolescence to help determine their future occupations. If x-rays show any serious congenital spinal defect, the youngster could direct his attention to a profession or trade that would demand the use of his brains and not his back for a livelihood. Pre-employment examinations given to 8,488 persons for two firms that have many jobs potentially hazardous to the low back showed that 41.1 per cent had congenital abnormalities and 20 per cent had various other spinal defects.—Dr. Rex L. Diveley, Kansas City, Mo., before the 18th annual Congress on Industrial Health.



AFTER the menopause

1. Postmenopausal urethritis – pretreatment urethral smear. Absence of normal cornified squamous cells.

2. After 2 weeks' treatment with FURESTROL Suppositories — squamous cells reflect healthy new epithelium.

cytologically complex...

with a mucosa affected by estrogen deficiency... reflected by postmenopausal atrophy with susceptibility to infection... a frequent source of pelvic distress.[4]

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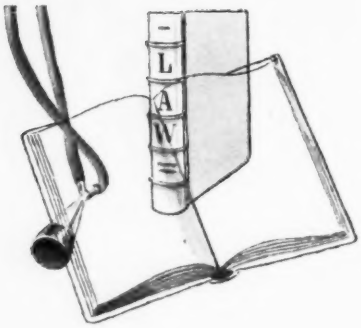
antibacterial... anesthetic... gently dilating

Each Furestrol Suppository contains Furacin 0.2%, diperodon·HCl 2%, and diethylstilbestrol 0.0077% (0.1 mg.) in a water-dispersible base.
Hermetically sealed in orchid foil, box of 12.

4. Youngblood, V. H.; Tomlin, E. M.; Williams, J. O. and Kimmelstiel, P.: Tr. Southeast. Sect. Am. Urol. Ass. (to be published) 5. Youngblood, V. H.; Tomlin, E. M.; and Davis, J. B.: J. Urol., Balt. 78:150, 1957.

EATON LABORATORIES, NORWICH, NEW YORK



Forensic Medicine

Scientific Reliability of Blood Grouping Tests

JOHN F. LOMBARD

Boston, Massachusetts

THERE is substantial authority to support the scientific reliability of blood grouping tests to prove biologically the impossibility of paternity." This quotation is from Commonwealth v. Stappen, 1957 Advance Sheets 815, 143 N.E. 2d. 221, wherein the decision was written by Mr. Justice Williams of the Massachusetts Supreme Judicial Court.

The defendant was brought in by complaint to a district court for nonsupport of his wife and twin minor children. Blood grouping tests were done by agreement of both parties. Blood samples were taken from the husband, the wife and the two children, and the tests were done by Dr. A. Richardson Jones, one of the country's leading experts in blood grouping, at The Blood Grouping Laboratory in Boston. There was a clear genetic exclusion of the defendant's paternity of the twins.

Here are the actual test results:

	Anti-A	B	C	C^{u}	c	D	E	e	M	N	K	Fy^{a}
Putative father	+	0	+	0	0	+	0	+	+	+	0	+
Mother	+	0	0	0	+	0	0	+	+	+	0	+
Child	+	0	0	0	+	0	0	+	+	+	0	0
Child	+	0	0	0	+	0	0	+	+	+	0	+

(+: agglutination, indicating presence of blood group factor. 0: no agglutination, indicating absence of blood group factor.)

"In the above results attention is directed to the columns headed 'C' and 'c.' The mode of inheritance of these factors is such that the finding of the 'c' factor in the blood of a child implies that one or the other parent must also possess it. If of the pair 'C' and 'c' only the factor 'c' is present in the child's blood, then both parents must possess this factor. In the present case the children possess the 'c' factor and lack the 'C' factor. The mother also possesses the 'c' factor and lacks the 'C' factor. Therefore it is clear that the mother can only contribute 'c' to her children.

JOHN F. LOMBARD

"However, repeated tests of the putative father's blood showed him to possess only the 'C' factor and to lack the 'c' factor. This means that all of the children of whom he is the true father must possess the 'C' factor. He can never contribute the 'c' factor because he lacks it. Since neither of the children possesses the 'C' factor, the putative father cannot, in my opinion, be their true father."

There was a limited hearing in the district court, and the judge waived jurisdiction and held the defendant for the grand jury. After indictment and when the case was reached in the superior court, apparently an objection was raised

(Continued on page A-42)

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"Cardiac patients who show significant manifestations of anxiety should receive ataractic treatment as part of the therapeutic approach to the cardiac problem."[1]

1. Waldman, S., and Pelner, L.: Am. Pract. & Digest Treat. *8*:1075 (July) 1957.

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to the blood grouping tests done for use in the district court. A new motion was then filed, but the Commonwealth objected to its allowance on the ground that the G.L. (Ter. Ed.) ch. 273, s. 12A was inapplicable to proceedings for nonsupport under statute 1. The trial judge reported to the Massachusetts Supreme Judicial Court, without decision, the following questions of law under G.L. (Ter. Ed.) ch. 278, s. 30A:

"1. Whether the provisions of G.L. (Ter. Ed.) ch. 273, s. 12A are applicable to proceedings brought for nonsupport of minor children under G.L. (Ter. Ed.) ch. 273, ss. 1,2.

"2. Whether expert testimony of blood tests, which show an exclusion as defined in G.L. (Ter. Ed.) ch. 273, s. 12A, is admissible on the question of paternity in criminal proceedings brought under G.L. (Ter. Ed.) ch. 273, s. 1, for nonsupport of minor children born during wedlock."

Blood grouping test statute, s. 12A, states:

"In any proceeding to determine the question of paternity, the Court, on motion of the defendant, shall order the mother, her child and the defendant to submit to one or more blood grouping tests, to be made by a duly qualified physician or other duly qualified person, designated by the Court to determine whether or not the defendant can be excluded as being the father of the child. The results of such tests shall be admissible in evidence only in cases where definite exclusion of the defendant as such father has been established. If one of the parties refuses to comply with the order of the Court relative to such tests, such fact shall be admissible in evidence in such proceeding unless the Court, for good cause, otherwise orders."

In answer to the aforementioned questions, the Supreme Judicial Court said:

"1. As the present indictment is not a 'proceeding to determine the question of paternity,' s. 12A does not in our opinion authorize the Court to order the mother and children therein named to submit to a blood grouping test.

"2. Apart from statutory authority we think expert testimony of blood grouping tests showing the definite exclusion of the defendant as the father of a child the support of whom is the object of an indictment or complaint under ch. 273, s. 1 is admissible if otherwise competent."

It may be noted that apart from statutory authority, experience through the years has shown that there are not many cases in which the parties will agree to a blood grouping test as was

(Continued on page A-44)

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AND
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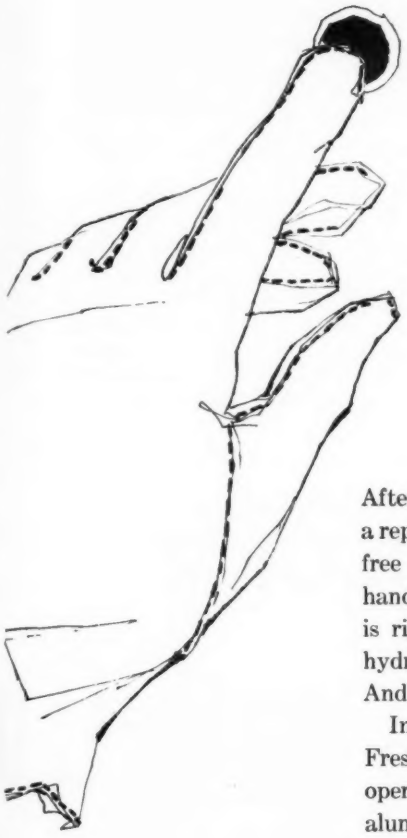

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done in the case under discussion. Note also that the C-D-E nomenclature was used instead of the Rh-Hr. (For a committee report on C-D-E and Rh-Hr, see J.A.M.A., August 31, 1957, p. 2036.)

Presumption of Legitimacy

The presumption of legitimacy has been affected in that scientific proof of nonpaternity is now admissible as an additional factor to prove beyond reasonable doubt that a husband could not have been the father of children. This presumption is like mist before the morning sun; the sun will cause mist to disappear, and proper evidence will cause this presumption to disappear. The words of the court are important in this regard: "There is a presumption of legitimacy in the case of a child born in wedlock which can be overcome only by facts which prove beyond reasonable doubt that the husband could not have been the father. . . . Proof of the impotency of the husband or no access to his wife is held to be sufficient. . . . Since like certainty of proof appears obtainable through the definite exclusion of the husband's paternity by the tests here under consideration, it follows that evidence derived from blood grouping tests would warrant a finding beyond a reasonable doubt that the defendant is not the father of either child named in the indictment and would be admissible."

The case was remanded to the superior court for further proceedings in conformity with this opinion. Up to now it has not been reheard. In view of what was said in the decision there must be a "not guilty" finding or verdict in regard to the nonsupport of the children.

It is obvious that if the parties had not agreed to blood grouping tests and had gone to trial without the aid of science (the Massachusetts Supreme Judicial Court has said that a trial court could not order a blood test in this type of nonsupport case), the result would have been different. Compared with statutes of other states the Massachusetts statute on blood grouping is inadequate and insufficient.

The eminence of the Massachusetts Supreme Judicial Court is well known throughout the United States, and its recognition of the scientific reliability of blood grouping tests and of their admissibility in evidence in applicable cases is a step forward in science. It is encouraging and rewarding to the blood grouping experts who labor untold hours in their laboratories in an endeavor to cast light on the shadowed path humanity must travel.

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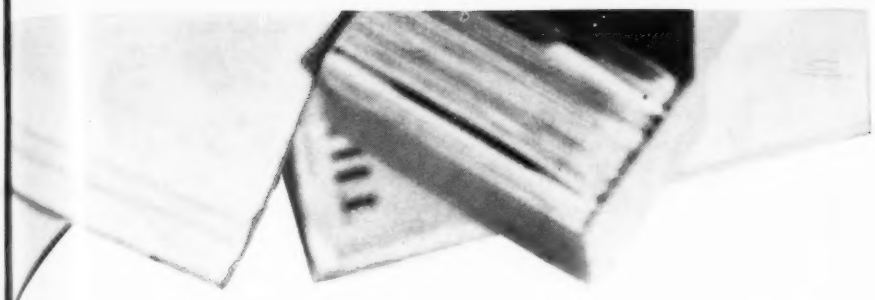

Gastric distress accompanying "predni-steroid" therapy is a definite clinical problem—well documented in a growing body of literature.

n view of the beneficial re-es observed when antacids and diets were used concom-with prednisone and predni-, we feel that these measures d be employed prophylacti-to offset any gastrointestinal ffects."—Dordick, J. R. *et al.*: State J. Med. 57:2049 (June 957.

*"It is our growing conviction that all patients receiving oral steroids should take each dose after food or with adequate buffering with aluminum or magnesium hydroxide preparations."—Sigler, J. W. and Ensign, D. C.: J. Kentucky State M. A. 54:771 (Sept.) 1956.

*"The apparent high incidence of this serious [gastric] side effect in patients receiving prednisone or prednisolone suggests the advisability of routine co-administration of an aluminum hydroxide gel."—Bollet, A. J. and Bunim, J. J.: J. A. M. A. 158:459 (June 11) 1955.

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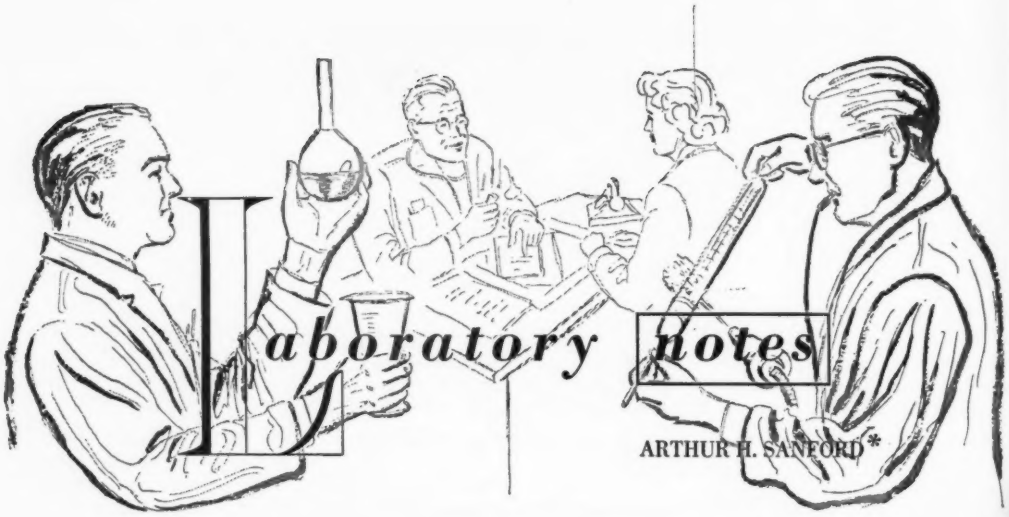

ARTHUR H. SANFORD*

Chlorides in Urine

In this column last month, I described the Fantus test, but I did not give the reference to the article[1] in which this test was originally published. The title "Fluid postoperatively" does not indicate that the article contains a simple modification of a test for a rough determination of the amount of chloride in a specimen of urine.

At this point, I would like to digress to comment on the ambiguity that often develops from headlines in newspapers and from titles in medical publications. A title is necessary, but often it cannot encompass in a few words what the author is attempting to present. For example, more than 30 years ago, I published a paper in the *Journal of Laboratory and Clinical Medicine* on a photographic method of counting blood cells. The method was entirely original as far as I knew. In this belief, I had the work all ready for publication when I discovered that the idea was *not* new and that it had been published nearly 50 years previously. The description of the method was entirely buried under the title "Experiments and clinical observations on the hematinic properties of dialyzed iron."

*Emeritus Staff, Section of Clinical Pathology, Mayo Clinic; Director of Laboratories, Rochester State Hospital, Rochester, Minnesota.

Now let us return to the subject of chlorides in urine. In "Fluid postoperatively," Fantus warned against the careless use of fluids intravenously after operations, without considering the amount of chloride eliminated in the patient's urine. Excessively low or high salt elimination is undesirable; in addition, the patient's sugar tolerance may be low after an operation. A simple tablet test for chloride determination was proposed by Free and Cook.[2] The tablet contained silver nitrate, potassium chromate, sodium nitrate, citric acid and sodium bicarbonate. These tablets may be used in an office or laboratory, or they may even be used by the patient himself.

Of the many methods for determining the amount of chlorides in urine and in blood plasma or serum, one of the most accurate is that of Schales and Schales.[3] This method is cited in Lippman's[4] work, and may be described in the following manner:

Reagents:

1. Standard sodium chloride solution, 1.000 gm. per liter.
2. 0.05 N nitric acid. (Dilute 25 ml. of 2 N nitric acid to a liter with distilled water.)

(Continued on page A-60)

Clinical experience[1,2,3] indicates that CELONTIN:

- provides effective control with minimal side effects in the treatment of petit mal and psychomotor epilepsy;
- frequently checks seizures in patients refractory to other medications;
- has not been observed to increase incidence or severity of grand mal attacks in patients with combined petit and grand mal seizures.

Optimal dosage of CELONTIN should be determined by individual needs of each patient. A suggested dosage schedule is one 0.3 Gm. Kapseal daily for the first week. If required, dosage may be increased thereafter at weekly intervals, by one Kapseal per day for three weeks, to maximum total daily dosage of four Kapseals (1.2 Gm.).

1. Zimmerman, F. T., and Burgemeister, B.: *Arch. Neurol. & Psychiat.* **72**:720, 1954.
2. Zimmerman, F. T., and Burgemeister, B.: J.A.M.A. **157**:1194, 1955.
3. Zimmerman, F. T.: *Arch. Neurol. & Psychiat.* **76**:65, 1956.

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3. Indicator: 100 mg. diphenylcarmine (Eastman KODAK® No. 4459) dissolved in 100 ml. of 95 per cent alcohol. Store in a dark bottle.

4. Standard mercuric nitrate solution. This is made so that 1.00 ml. of mercuric nitrate solution is equivalent to 0.50 ml. of standard sodium chloride solution.

Method:

1. Dilute 0.50 ml. of urine to 5.0 ml. with 0.05 N nitric acid in a 50 ml. Erlenmeyer flask.
2. Add eight drops of indicator solution.
3. Titrate with mercuric nitrate solution to a permanent pink-violet color. The number of milliliters of mercuric nitrate solution used is equivalent to 1 mg. per milliliter or 1 gm. per liter of sodium chloride when a urine sample of 0.50 ml. is used.

A modification of this method was devised by Scribner.[5] In this method, two 1 ml. tuberculin syringes are used. Also assembled in the set of supplies are four 2 oz. dropper bottles, one 1 oz. dropper bottle, a test tube 1 by 4 in., and another test tube that is 3 in. long but large enough to allow the 4 in. tube to slip inside. The reagents are quite similar to those described in the Schales and Schales method, with some modification to fit the method of titration. (Complete sets of supplies, including the reagents, can be obtained from Rochester Products Company, Rochester, Minnesota.) By this method, each 0.01 ml. of mercuric nitrate used in the titration is equivalent to 1 mEq. per liter of chloride.

Normally 10 to 15 gm. of chloride is excreted in urine in 24 hours. In some cases of nephritis and in febrile diseases, especially pneumonia, the excretion of chloride is diminished. There is also a diminution of chloride excretion in extensive burns, severe diarrhea, anemia and carcinoma of the stomach. If a patient is on a restricted diet and still excretes a large amount of chloride, it is possible that impairment of renal tubular sodium absorption may exist. Further restriction of diet may be contraindicated.

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1. FANTUS, B.: Fluid postoperatively. J.A.M.A. 107:14-17, 1936.
2. FREE, A. H. and COOK, M. H. A.: Simplified method for urine chloride determination. Am. J. Clin. Path. 22:588-591 (June) 1952.
3. SCHALES, O. and SCHALES, S. S.: A simple and accurate method for the determination of chloride in biological fluids. J. Biol. Chem. 140:879, 1941.
4. LIPPMAN, R. W.: Urine and the Urinary Sediment. Springfield, Illinois, Charles C Thomas, 1951.
5. SCRIBNER, B. H.: Bedside determination of chloride; a method for plasma, urine and other fluids and its application to fluid balance problems. Proc. Staff Meet. Mayo Clin. 25:209-218 (April) 1950.

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"COTHERA" moderates intensity and frequency of coughing through a selective action apparently on the medullary cough center . . . subdues but does not abolish the cough reflex. The natural reflex for removal of secretions is retained.

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"COTHERA" provides a local anesthetic and soothing demulcent action to induce almost immediate relief of 'sandpaper' throat and 'annoying tickle'. . . followed by sustained moderation of the cough reflex, lasting for four to six hours and frequently throughout an entire night with one dose.

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"COTHERA" is nonaddictive; does not cause respiratory depression, gastric irritation, or constipation. It is well tolerated by children and elderly patients, even after continued use. (Antitussive action is equal to ¼ gr. codeine per teaspoon dose.)

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"COTHERA" is completely acceptable to all age groups.

Indications: "COTHERA" Syrup is specifically indicated for irritating, useless, or chronic coughs such as those associated with the common cold, children's diseases, excessive smoking. It may be used safely for short-term or prolonged treatment.

Dosage: Adults and children over 8 years — 1 to 2 teaspoonfuls (25-50 mg.) three or four times daily. Children, 2 to 8 years—½ to 1 teaspoonful three or four times daily.

Supplied: 25 mg. per 5 cc. (teaspoonful), bottles of 16 fluidounces and 1 gallon.

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Medicine from Abroad

FROM POSTGRADUATE MEDICINE'S CORRESPONDENTS

NETHERLANDS

Immunity to whooping cough—The susceptibility of infants to whooping cough, even when the mother is immune, has been the subject of recent research in Holland where pertussis is a common disease. In most infectious diseases, immunity of the mother gives passive protection to the infant during the first six months of life; but with whooping cough this is not the case.

Dr. E. Li Fo Sjoe hoped to discover one or more pertussis antibodies that were not transferred by the placenta from mother to child and could be considered the protecting antibodies (Investigation About Transfer of Antibodies Against Whooping Cough From Mother to Child. Amsterdam, H.v.d. Linde & Zn, 1957). Using as subjects a group of mothers and their newborn infants, he investigated agglutination, complement fixation, the opsonic index and the presence of mouse-protecting antibodies. Samples of serum were obtained for these tests from mothers at the end of their pregnancy and from the umbilical blood; he was able to obtain 84 sera from the mothers and children.

The agglutination titers were very low. One sample of serum showed a titer of 1:128; four samples showed titers of 1:64, and the other results were lower. Tests of agglutinins in the umbilical blood also showed low titers.

The opsonic index was determined by mixing a granulocyte suspension, a suspension of *Hemophilus pertussis* phase I and the serum to be tested. Slides were made from this mixture and stained, and the number of bacteria phagocytized by each of 100 granulocytes was counted. The index, which could be 0 minimal and 1000 maximal, ranged from about 200 to 600 in both mothers and infants.

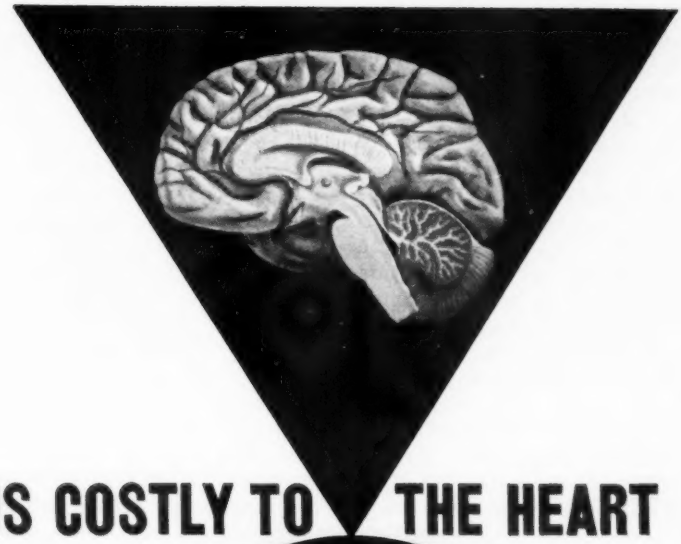
In most cases, the complement fixation test was negative; in a very few cases, a low titer was found in both mothers and children. The interpretation of the mouse-protection test, done with the sera having the highest agglutination titers, was rather difficult, but some trace of protective antibody was found occasionally in the blood of the mother or child.

The blood of six hyperimmune rabbits and the blood of their young were compared. As a large number of antibodies was present, the interpretation was much easier. Agglutinins and mouse-protecting antibodies were present in considerable quantities in both the mother animals and their offspring.

Dr. Sjoe concludes that probably all antibodies against pertussis are transferred by the placenta. The amount present in the child is not significantly lower than that in the mother. There seems to be no explanation why these antibodies should be sufficient to protect the mother and not to protect the infant, unless the local immunity of the bronchial tissue plays an important role.

Hydramnios—Investigations have shown that the existence of hydramnios during pregnancy

(Continued on page A-74)



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*Waldman, S. and Pelner, L.: Management of anxiety associated with heart disease. Am. Pract. & Digest Treat. 8:1075, July 1957.

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can be an important indication of the presence of some disease or malformation in the mother or child. Dr. W. H. M. van der Velden (The Importance of Hydramnion for the Early Recognition of Disease or Malformation in Mother and Child. Gouda, N. V. Drukkerij Koch & Knuttel, 1957) reviewed the case histories of all maternity patients who came under the care of the Department of Obstetrics, University of Amsterdam, from January 1, 1939 to December 31, 1950. All patients who had hydramnios were registered and, if possible, were re-examined. The existence of hydramnios was assumed when the quantity of amniotic fluid amounted to 2000 cc. Only when the amount was 3000 cc. or more were the classic symptoms seen: Auscultation and palpation of the fetus became impossible, and the fundus uteri was much higher than could be expected from the duration of the pregnancy. Of the 19,816 patients examined, 260 (1.3 per cent) had hydramnios, but of these the classic form was seen in only 87 (0.4 per cent).

In some patients with hydramnios, these other complications of pregnancy were frequently present: (1) toxemia; (2) shortened period of gestation—a result, too, of the great number of malformed infants born in cases of hydramnios; (3) abnormal presentation—there was some increase in the number of breech and transverse presentations, and face and brow presentations were much more common; (4) fluxus post partum; and (5) solutio placentae, a rare complication which must be the result of sudden draining of the amniotic fluid.

The following causes for hydramnios were found: malformation of the child; multiple pregnancy; Rhesus antagonism; and diabetes. The condition was present in (1) 49 of 52 cases of anencephalia, in 8 of 10 cases of absence of the neck or hygroma cysticum colli congenitum, in 7 of 8 cases of esophageal atresia, and in all of 8 cases of intestinal obstruction; (2) 31 (8.5 per cent) of 360 cases of multiple pregnancy; (3) 10 of 13 cases of hydrops fetalis and in 3 of 9 cases of intra-uterine death without hydrops; and (4) 46 of 96 cases of diabetes (in another 80 cases, the patients later developed diabetes). In 18 of the 260 cases, the cause was unknown.

On the basis of his findings, Dr. van der Velden feels it is worthwhile in cases of hydramnios without obvious origin to look for an intestinal obstruction or esophageal atresia in the child as soon as possible after birth. During pregnancy, the possibility of Rhesus antagonism or diabetes

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should be investigated. In these cases, early treatment can improve the life expectancy of the child.

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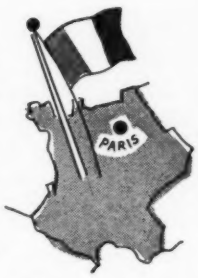

Purpura—As a result of clinical and biologic studies recently published in *La Presse médicale*, Professor Jean Bernard and his collaborators arrived at a new classification of purpura due to affection of capillary vessels, a condition he refers to as "Schönlein-Henoch disease."

Common symptoms of this disease are:

1. Purpuric rash, which is composed of small petechial spots less red than those found in purpura caused by diseased platelets. Caused by bleeding and congestion, it becomes paler under the pressure of a glass slide, and is without ecchymosis. Biopsy reveals an inflammation around the capillary, marked by diapedesis, as described by Chevallier, with inflammatory cuffs dotted with red cells; there is no thrombus and no trouble occurs in the connective tissue.

2. Articular manifestations are generally indistinct and transient, but detectable on careful questioning.

3. Fluctuating disturbances are indicated by x-ray and sometimes by blood in the stool.

4. Some trouble in the kidneys, mostly histologic, is shown by microscopic occurrence of blood, casts and white blood cells in the urine.

The usual biologic tests are negative, and there is no change in either the differential blood count or the blood coagulation. However, Bernard found a symptom which he especially studied as a characteristic and essential element: The patient's serum shows an increase in the toxic potency against capillaries. To test this the blood is kept in contact with sheep's red blood cells for an hour to remove Forssman's antibodies; then it is centrifuged, and 0.2 cc. of the serum is injected into the skin of a white guinea pig. Six to 24 hours later an ecchymosis develops which may become necrotic. It is easy to make the reaction negative after destroying the complement by heat and to make it positive again by adding fresh complement, which shows that the effective principle is carried by gamma globulins seemingly responsible for the fixation of the complement.

(Continued on page A-78)

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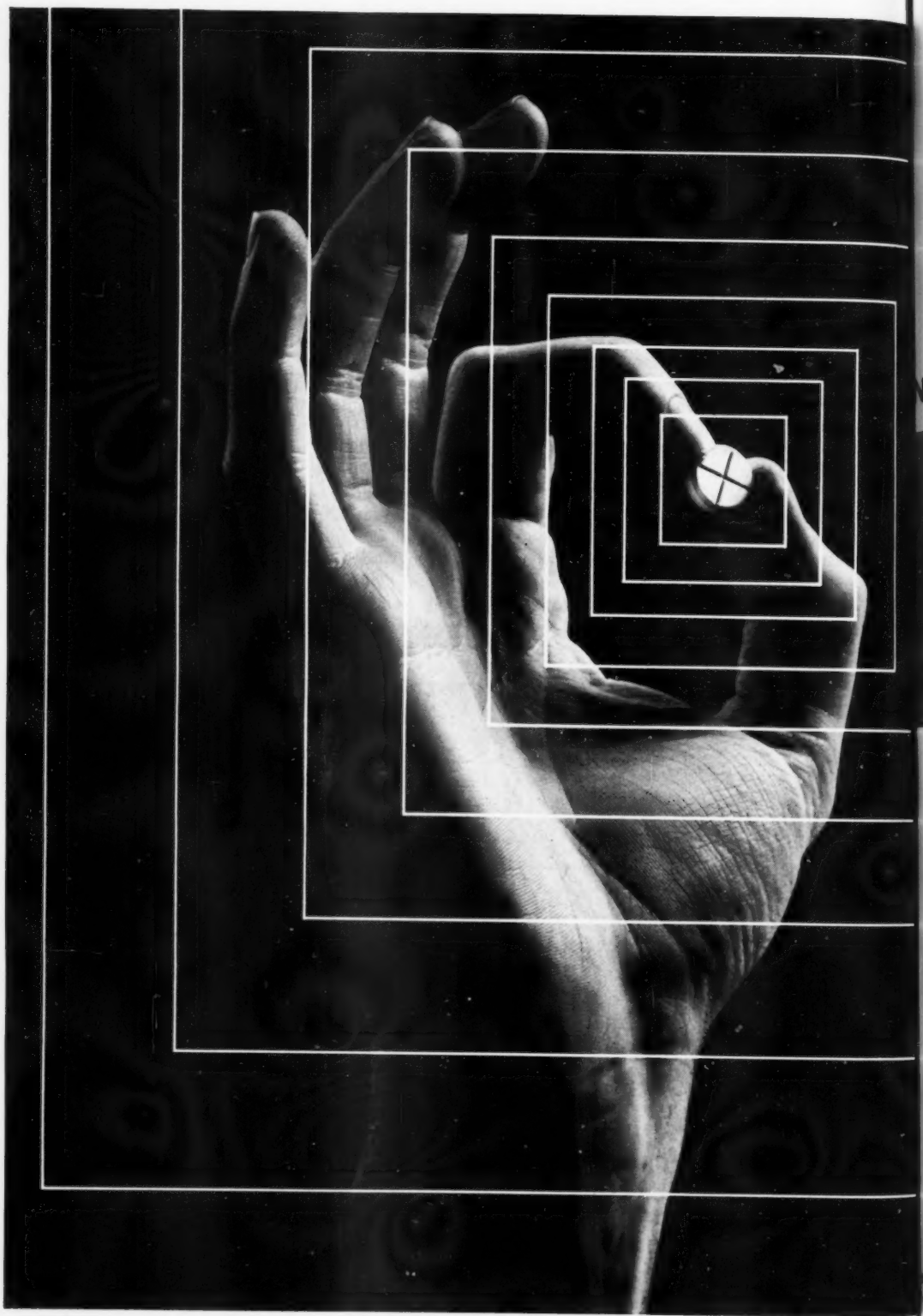

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TABLETS: Each tablet contains 0.5 Gm. (7½ grains) of sulfamethoxypyridazine. Bottles of 24 and 100 tablets.

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1. Nichols, R. L. and Finland, M.: *J. Clin. Med.* 49:410, 1957.

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This test is reliable in all cases of Schönlein-Henoch purpura, but it also gives a positive result in other diseases, such as acute rheumatic fever, certain types of glomerulonephritis, and pulmonary tuberculosis. The reaction seems to be linked with an immunologic process still unknown. Certain immune bodies against capillaries may be at work.

On the basis of a study of 51 cases, the professor and his collaborators distinguish three clinical forms of Schönlein-Henoch disease.

1. The allergic inflammatory purpura develops on a known allergic area following asthma, hives, prurigo, etc., and in a person with some stigma in the family history. The patient reacts positively to food and drug tests, and after the removal of its cause, the purpura disappears. Such cases are not true purpura, for their petechial spots are relatively pale and the least purple among purpura. Purely erythematous spots, papules, edemas and itching occur together. There are transient forms, with Gougerot's triad (purpura, nodules and concentric circles of redness), which progress in attacks. Depending on the individual, a great variety of renal, digestive and articular signs may occur, often very vaguely. The biologic signs include a higher than normal eosinophil count in the blood and lowered antihistaminic potency of the serum.

2. The acute inflammatory idiopathic purpura occurs almost exclusively in children. This is the old-fashioned "rheumatoid purpura." The rash consists of small petechial spots grouped around joints, all alike, without itching and other elements. When the patient is standing, the rash becomes worse after a few hours. There is steady pain in the joints, and a few very indistinct signs are present in the kidneys. Never of allergic origin, it will last a few weeks.

3. The chronic idiopathic purpura is found only in adults. The rash is similar to that seen in acute purpura, and it also is sensitive to a standing position, but the spots are very faint. Digestive, articular and renal signs are always present, although they do not necessarily follow the remissions of skin eruption. These remissions, which may last from a few days to several weeks, are recurrent during the year. The histamine-fixing potency of the blood serum slightly diminishes. One of the important elements is the increase in blood proteins, with an increase of the gamma globulins at electrophoresis. One may detect occasional allergic incidents in the patient's

(Continued on page A-82)

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history and successfully prove the allergic origin of these relapses.

The physiopathologic mechanism of purpura of capillary origin is unknown. Yet one may compare it with the cytopenic syndromes—affecting the red cells (anemias), white cells (agranulocytoses), and blood platelets (hemorrhagic states)—which can be grouped into three types: allergic and idiopathic acute and chronic forms. Isn't it possible that one is dealing here with a conflict between allergens and auto-antibodies? This is, at least, the working hypothesis suggested by Professor Bernard.

DENMARK

Treatment of hypertension with ganglion-blocking agents—In a recent issue of *Ugeskrift for laeger*, J. Prytz Clausen reported on the use of the ganglion-blocking agents Oxaditon and ANSOLYSEN® in the treatment of 30 patients (23 women and seven men) with essential hypertension. The drugs were given alternately in average daily dosages of 1123 mg. Oxaditon orally and 338 mg. Ansolysen for periods averaging nine months.

Subjective improvement resulted in all patients. Regression of retinopathy was observed in four cases and reduction of the heart volume in two cases. The electrocardiographic records were essentially unchanged. There was no aggravation of either objective or subjective symptoms during the treatment.

Oxaditon proved an effective ganglion-blocking agent. Because of its gentle and uniform action, it is particularly suitable for use in ambulant patients. The side effects of the dosage used were insignificant.

Prolonged treatment of mild hypertension with reserpine and hydralazine—A. Grüner and H. Stürup reported in *Ugeskrift for laeger* on the use of reserpine (SERPASIL®) or reserpine and hydralazine (APRESOLINE®) in treating 40 outpatients who had slight degrees of hypertension. All the patients were classed in groups 1 and 2 according to the Bechgaard and Hammarström classification. Thirteen patients discontinued the treatment or had not been treated for six months at the time of the report. Twenty-seven patients, of whom 17 had an average diastolic blood pressure of under 110 mm. Hg when up and around (group 1) and 10 had a

(Continued on page A-85)

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diastolic blood pressure of over 110 mm. Hg but without hypertensive changes in the organs (group 2), were treated for from 6 to 28 months. The average period of treatment was 15.3 months.

A significant satisfactory fall in blood pressure occurred in 6 of 17 patients in group 1 and in 6 of 10 patients in group 2. The abnormal electrocardiograms and organic changes, particularly enlargement of the heart, present in patients in group 1 did not improve in any case. Organic changes or deterioration occurred in three patients, all of whom had an unsatisfactory fall in blood pressure. Transient hemiplegia in one patient was the only organic change noted in the patients of group 2.

This report does not permit any conclusion concerning the value of the treatment in preventing complications in this particular group of patients. None of the patients died; however, there was no convincing improvement of the subjective symptoms.

Long-term, combined drug therapy in severe nonmalignant hypertension—Stürup and Grüner also reported on the oral administration of different combinations of reserpine, hydralazine and pentolinium (Serpasil, Apresoline and Ansolysen) in 75 outpatients with severe nonmalignant hypertensive cardiovascular disease. All of the patients had a persistent diastolic blood pressure of more than 110 mm. Hg and retinal, cardiac, renal or cerebral complications. Four of the patients died within six months (three from strokes, one from suicide); seven patients discontinued the treatment, and 13 had not been treated for six months at the time of the report.

Fifty-one patients were treated for from 6 to 30 months. Of these, 42 were classed in group 3 of the Bechgaard and Hammarström classification, and nine were in group 4. In 26 patients, a sustained, unequivocal satisfactory drop in blood pressure was obtained. This is interpreted as a drop in mean blood pressure (diastolic blood pressure plus one-third of the pulse pressure) of at least 20 mm. Hg and to below 140 mm. Hg (corresponding to below 210/105). The average fall of mean blood pressure in the group which responded satisfactorily was 35 mm. Hg, corresponding to a fall from 240/120 to 165/105. In the group which did not respond satisfactorily, the fall of mean blood pressure was 17 mm. Hg.

In 10 patients, a satisfactory fall of blood pressure was obtained with Serpasil alone; in seven,

(Continued on page A-86)

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with Serpasil plus Apresoline, and in nine, after combination with Ansolysen.

Retinal hemorrhages and exudates disappeared in 13 of 14 patients in both the group with satisfactory responses and the group which responded unsatisfactorily. The occurrence of a negative T_1 wave in electrocardiograms was reduced from nine to three in number in the group which responded satisfactorily, but it remained at 14 in the patients with unsatisfactory responses.

The incidence of albuminuria was reduced from 11 to 2 cases in the satisfactory-response group, and from 10 to 8 in the unsatisfactory-response group. The transverse size of the heart was not significantly diminished.

One of the 50 patients died as a result of uremia. One patient had a stroke with hemiparesis. There was no incidence of coronary thrombosis or congestive heart-failure. Forty-seven patients were still receiving treatment.

Surgical treatment of patent ductus arteriosus in infants and young children—A. Gammelgaard and F. Therkelsen reported in *Ugeskrift for laeger* on the surgical closure of patent ductus arteriosus in children ranging in age from birth to 24 months. In 80 per cent of the cases, systolic pressure in the pulmonary artery was elevated (greater than 30 mm. Hg). The percentage of pulmonary hypertension (greater than 60 mm. Hg) was highest in the group of patients less than six months of age.

Although readings of pulmonary artery pressure taken during the closure of the ductus indicated a fall in pressure, it was not to normal values. In all cases, the patent ducts were completely closed by ligature and suture ligature. At follow-up examinations, normal heart sounds were heard in 15 patients.

Respiratory difficulties and attacks of cyanosis occurred postoperatively in five children. A three month old girl who had had a pulmonary artery pressure of 60/38 died from cardiac and respiratory insufficiency nine hours after operation. However, considering the high incidence of pulmonary hypertension, the operative mortality is quite low (5 per cent).

The authors recommended operative treatment of symptomatic patent ductus arteriosus in infancy. This procedure may prevent death from heart-failure, particularly when the condition causes symptoms before the patient is six months old. Complete regression of the pulmonary hypertension may depend on the early closure of the patent ductus arteriosus.

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FUNCTION OF VITAL ORGANS—*First of a Series*

Evaluation of Cardiac Function in Clinical Practice

C. K. FRIEDBERG*

Mount Sinai Hospital, New York

METHODS for evaluating cardiac function are becoming increasingly important. Formerly, tests of cardiac function were applied chiefly to presumably healthy individuals who were being considered for admission to those branches of the armed services which might impose a special strain on the heart. Now such appraisals of cardiac function must be applied with increasing frequency to the following: (1) cardiac patients who are being considered for corrective surgery in whom the evaluation of cardiac function serves both as an aid in deciding the desirability of operation[1] and also as a basis for comparison with postoperative cardiac function to determine the effectiveness of the operative procedure;[2] and (2) cardiac patients who have recently recovered from an acute myocardial infarction or other acute cardiac disease in whom tests of cardiac function help determine their ability to undertake gainful work and particularly their ability to undertake specific types of work.[3,4]

C. K. FRIEDBERG

The physician's evaluation of cardiac function may be made by subjective interpretation based on a careful history and physical examination or by individual objective tests. As a rule, the subjective evaluation based on a careful and skillful history and examination is as reliable as any objective test. But subjective evaluations may vary because of the differences in care and skill of different physicians, and comparisons may be invalid when evaluations are made by different physicians.

Subjective Evaluation of Cardiac Function

The history and examination serve to determine whether or not heart disease and heart-

*Division of Cardiology, Department of Medicine, Mount Sinai Hospital, New York, New York.

failure are present. Certain cardiac murmurs, cardiac enlargement and cardiac arrhythmias indicate cardiac disease but do not provide an appraisal of cardiac function. Similarly fluoroscopic or roentgenographic examination of the heart and electrocardiography may likewise disclose the presence of heart disease without presenting information as to cardiac function. Certain symptoms and signs, such as dyspnea, nocturnal dyspnea, orthopnea, pulmonary and subcutaneous edema, enlargement and tenderness of the liver and engorgement of the cervical veins, occurring in a patient with heart disease, indicate heart-failure.[5] This may be confirmed by finding an increased circulation time and an elevated venous pressure. The presence or absence of heart-failure and the severity of its manifestations provide a rough index of cardiac function, but usually only when this is seriously impaired.

Interest in cardiac function is concerned not merely with the presence or severity of heart-failure but with the ability of the heart to cope with the various everyday activities. To determine this, the patient must be carefully questioned regarding his capacity to perform the very specific activities and exertions in which he engages from day to day. If the patient is uncertain, the questioning should be repeated at a later examination after he has carefully noted his responses to these various activities. He should be asked how far he can walk on the level, uphill and upstairs. Inadequate cardiac function is denoted by dyspnea, cardiac pain or exaggerated fatigue, but they must appear during the course of the exertion and diminish or disappear with rest. Women should be queried also as to their response to every usual activity of their housework, shopping, carrying packages, etc., and men must be questioned about every specific element in their work. The ability to engage in various types of exertion should be investigated from the viewpoint of the patient's response both to peak activity and also to prolonged activity. The ability to engage in sexual relations without cardiac pain, distressing dyspnea or pulmonary edema is an important index of cardiac function.

A careful consideration of the patient's activities and his response to these activities in terms of discomfort or specific symptoms permits the physician to make a subjective appraisal of cardiac function which is extremely useful and often at least as accurate as that made from any objective test. The responses of the patient to the various activities must be appraised in connection with his physical training, restrictions of activity previously imposed by family or physician, and his own fear of exertion because of the knowledge that he has heart disease.

When the subjective evaluation of cardiac function is used to measure the effectiveness of a cardiac operation, the response to the identical specific everyday activities must be compared. When cardiac function is being appraised to determine the patient's ability to resume employment after an acute cardiac disturbance, his response to washing and shaving himself, dressing, walking progressively longer distances, climbing a flight of stairs, and carrying small packages can usually serve to predict how he will function at his work. Evaluation of these responses should be made only after several trials on successive days in order to minimize the factor of inactivity during his recent illness. Ultimately, his cardiac function is best indicated by his actual response to the resumption of his usual employment. In all these evaluations, other diseases, including psychic abnormalities, must be excluded as causes of any physical disability.

The New York Heart Association has set up the following functional cardiac classification based on the patient's response to physical activity which has proved to be very useful as a subjective evaluation of cardiac function:[6]

Class I—Patients with cardiac disease, but without resulting limitation of physical activity. Ordinary physical activity does not cause any undue fatigue, palpitation, dyspnea or anginal pain.

Class II—Patients with cardiac disease resulting in slight limitation of physical activity. They are comfortable at rest. Ordinary physical activity results in fatigue, palpitation, dyspnea or anginal pain.

Class III—Patients with cardiac disease resulting in marked limitation of physical activ-

ity. They are comfortable at rest. Less than ordinary activity causes fatigue, palpitation, dyspnea or anginal pain.

Class IV—Patients with cardiac disease resulting in inability to carry on any physical activity without discomfort. Symptoms of cardiac insufficiency or of the anginal syndrome may be present even at rest. If any physical activity is undertaken, discomfort is increased.

This classification has shortcomings with respect to the broadness of the categories, but for most purposes it will serve if the activities which can be performed without discomfort and those which produce symptoms are more specifically determined. The expression "ordinary physical activity" denotes either the physical performance of which the patient was capable prior to his manifest cardiac disease or such activity as would be regarded as normal for a person of the same age, sex and physical development.

Objective Tests of Cardiac Function

Objective tests of cardiac function measure a quantitative response to a cardiac stress. Exercise is the stress most commonly employed in these tests. But instead of the variable exercise involved in a patient's usual physical activities and in the variable activities of different persons a *standardized* exercise stress is employed. This is essentially identical or comparable for all patients tested. Instead of measuring the response to stress in terms of general discomfort or specific symptoms, one measures objective changes in pulse, blood pressure, cardiac output, respiration, electrocardiogram, size of the heart or oxygen consumption. Other stresses besides exercise have been used in cardiac function tests, such as breath holding, blowing against a fixed resistance and the Valsalva maneuver.

These objective tests of cardiac function have also been called tests of myocardial reserve or tests of physical fitness. The term myocardial reserve implies that the test measures the functional capacity of the heart to increase its performance beyond that required to satisfy basal needs. The term physical fitness indicates that the responses to these tests depend not only on cardiac function but also on training factors and on the adequacy of function of various other organ systems such as the lungs, muscles and nervous system.

Cardiac Output and Oxygen Consumption in Response to Exercise

The function of the heart is to provide an adequate blood supply for the needs of the tissues throughout the range of an individual's physiologic activities at rest, at work or at play. Furthermore, the adequate blood flow must be provided without causing unpleasant symptoms or persistent, serious abnormalities in circulatory dynamics. The normal cardiac output under basal conditions is approximately 3.1 l. per minute per square meter of body surface. But normal cardiac function is represented by a wide range of performance between basal and maximal requirements and cannot be expressed as a fixed mathematical value. With severe exercise, the cardiac output can be increased between 5 and 10 times for short periods, depending on training and athletic ability. In the common types of ergometer and stair-climbing tests involving only moderate exercise, the cardiac output is increased two to three times the basal value. However, in cases of impaired cardiac function the cardiac output may be diminished at rest and it may increase less than normally or not at all with exercise. Neukirch[7] used this abnormal response of the cardiac output to exercise as the basis of a test of cardiac function. The procedure is relatively complex and there is only a rough correlation between the results of the test and other evidences of cardiac disability.

The normal basal oxygen consumption is about 250 cc. per minute, which represents an energy cost of 1.25 calories per minute. With extreme exercise, this may be increased to a maximum of 10 to 20 times the basal value. With severely impaired cardiac function, oxygen consumption cannot be increased normally, but, with lesser degrees of cardiac impairment, oxygen consumption may increase normally with exercise even when the cardiac output is impaired, because the increased need for oxygen is satisfied by increased extraction of oxygen per unit of blood flow.

Cosby and his associates[8] proposed a dynamic exercise test of cardiac performance and early left-sided heart-failure based on the combined measurements of: (1) oxygen consumption in terms of increase over the resting level, (2) the ventilatory equivalent for carbon dioxide at rest (the amount of air inspired for 100 cc. of carbon dioxide produced), and (3) the ventilatory equivalent recovery time, this being determined by observations each minute for 20 minutes after completion of the three minutes of exercise on a bicycle ergometer. Normal persons can double their oxygen consumption during the measured exercise whereas patients with heart-failure cannot. In the normal person, the ventilatory equivalent for carbon dioxide is approximately 2.25 l. but becomes progressively larger in the presence of pulmonary congestion due to failure of the left side of the heart. Normally, the ventilatory equivalent returns to basal levels within 10 minutes after the exercise, but in the presence of left-sided heart-failure longer intervals are necessary. The test requires relatively complex equipment and technics. The range of normals and abnormals overlap. Abnormal values found by this test are a measure of pulmonary congestion and increased pulmonary resistance, such as occur with left-sided heart-failure, rather than a specific measure of cardiac function.

Other Hemodynamic Responses to Exercise Tests

One of the simplest clinical tests is to record the pulse rate, blood pressure and respiratory rate both before and after the patient has performed 20 knee-bendings or has hopped 50 times on one foot. In normal individuals the pulse rate should not rise more than 20 per minute after knee-bending, or more than 30 per minute after the hopping. In both tests, the pulse normally returns to the pre-exercise rate within two minutes after the exercise. The blood pressure and the respiratory rate should return to the control levels in two minutes.

Further standardization of the exercise was proposed by Master and Oppenheimer,[9,10] who devised an apparatus consisting of two steps, each 9 in. high, which were to be climbed and descended a variable number of times. The number of ascents and descents to be made in a period of one and a half minutes is indicated by tables which they set up, depending on the age, sex and weight of the subjects. In normal subjects the pulse rate and blood pressure return to the control level within two minutes after completion of the exercise. If symptoms appear, the test should be terminated promptly. Although this test indicates normal or abnormal performance with respect to the standardized exercise, it cannot be regarded as a specific, quantitative measure of cardiac function. Thus a patient studied before a mitral commissurotomy may show an abnormal response and continue to show an abnormal response even though the operation effects considerable improvement. This is due to the relatively severe strain imposed by the two-step test,[11] which exceeds that of most ordinary daily activities.[12] In fact, the strain is too severe to use as a test in cases of serious functional impairment of the heart. The test may not be a useful guide to the ability of the patient to resume his work after a heart attack because he may be able to perform the work involved in most occupations without discomfort yet respond abnormally to the two-step test. On the other hand, a normal response to the test may be useful since it indicates that the functional capacity is adequate for a large majority of jobs or occupations. A normal response to the test by a patient with acquired cardiovalvular disease may indicate that there is insufficient functional impairment to justify an operation.

Other standardized exercise tests of longer duration have been devised because many patients require at least three minutes of exercise to achieve a steady state and because the more prolonged procedures also test the patient's endurance, an important index of both cardiac function and general physical fitness. Bruce and associates[13] instructed ambulatory patients to walk slowly on a motor-driven treadmill at the rate of 150 ft. per minute, or 1.7 miles per hour, on a 10 per cent grade for 10 minutes, unless the test had to be discontinued earlier because of the patient's poor tolerance. A sphygmomanometer is attached

to the arm for recording blood pressure at one minute intervals; a face mask is worn by the patient to permit collection of expired air for continuous analysis of oxygen concentration, and a chest belt with three electrodes is attached to permit recording of a precordial electrocardiogram from the region of the cardiac apex. Observations are made during a four minute control period with the patient sitting, after one minute of standing, during the course of exercise, and during a five minute period of recovery. A proposed formula for a physical fitness index of exercise tolerance involved endurance (the number of minutes the test was tolerated up to 10), the average respiratory efficiency (as measured by the difference of oxygen concentration in inspired air, i.e., 20.9 volume per cent, and the average measured concentration in expired air during exercise), and the cumulative heart rate during the first three minutes of recovery. Normal values ranged from 13 to 26.

To simplify the above test for clinical office practice, Welch and associates[14] substituted for the motor-driven treadmill a single step, 8 or 9 in. high, which the patient climbed and descended 20 times per minute, an effort comparable to that imposed when walking up a 10 per cent grade on the treadmill ergometer at 1.7 miles per hour, and which, like the exercise on the treadmill, increases the oxygen consumption three to four times above the resting level. The test is continued for 10 minutes if possible, or for a briefer period as limited by the patient's tolerance. A physical fitness index is calculated from the endurance in minutes, from the average respiratory rate during the exercise, and from the cumulative heart rate during the first three minutes of recovery.

Breath-holding Test

Breath holding has been used as a simple form of stress, instead of exercise, and a breath-holding test of cardiac function has been devised. The normal person can hold his breath for 30 seconds or longer. Persons with a limited cardiac reserve cannot usually do this for more than 20 seconds. Breath holding may be tested after an exercise stress, for example, after some exertion such as 10 knee-bendings. After such exercise, the patient with diminished cardiac reserve is unable to hold his breath for more than 12 seconds.

Valsalva and Blowing Tests

The Valsalva maneuver, which may be performed by blowing a mercury column to a level of 40 mm. and maintaining it at that level for 10 seconds, acutely reduces the venous return to the heart. The response to this stress differs in patients with impaired cardiac function and in normal persons.[15-17] In normal persons, there is a reduction in the systemic arterial pulse pressure, followed, after cessation of the Valsalva maneuver, by a transient rise in the diastolic pressure above the control level (diastolic overshoot). The latter is attributed to a compensatory peripheral vasoconstriction secondary to the early fall in diastolic blood pressure. In patients with cardiac failure, there is no reduction in pulse pressure and no increase, and no overshoot. False positive and false negative results have been reported. In the absence of overt heart-failure the Valsalva test is likely to produce a normal response even when there is moderate functional cardiac impairment as indicated by other tests of cardiac reserve. According to Burroughs and Bruce,[18] the Valsalva test fails to discriminate between patients in classes I, II and III as graded by the criteria of the New York Heart Association, or between patients in whom the result of an exercise tolerance test is normal and those in whom it is markedly subnormal. Other studies indicate that patients with an abnormal Valsalva response fall into either class III or IV.[19]

Oxygen Debt Tests

Various tests have been based on the inability of the cardiac patient to increase oxygen consumption during a strenuous, standard exercise test, and on the increased oxygen debt of the cardiac patient after an exercise stress. Oxygen consumption in the normal individual is greater than at rest, not only during exercise but also for a brief period after exercise is discontinued. This persistently elevated oxygen consumption after discontinuation of exer-

cise represents an oxygen debt which was acquired during exercise because the oxygen consumption was inadequate to oxidize the excessive acidic metabolites. The oxygen debt is paid off by persistently increased oxygen consumption after the exercise is over. In cardiac patients, this oxygen debt is much greater than in normal persons. The oxygen consumption is measured before and after completion of a standardized exercise such as stair climbing, as described by Nylin,[20] and the oxygen debt is calculated by subtraction.

Ventilation Tests

The common forms of heart disease lead primarily to left-sided heart-failure and pulmonary congestion. There is consequent rigidity of the lungs with disturbance in capacity for ventilation. Thus patients with heart disease which results in pulmonary congestion will respond abnormally to pulmonary function tests even when there is no primary, intrinsic pulmonary disease.

Determination of the vital capacity was long employed as a measure of pulmonary function, notably in cases of pulmonary tuberculosis and obstructive emphysema, but also in cases of mitral stenosis or congestive heart-failure. The vital capacity is determined by measuring with a spirometer the amount of air that can be expelled by a maximal expiration after a maximal inspiration. Normally, the vital capacity is 4 to 5 l. or, more accurately, 2.5 l. in males and 2 l. in females per square meter of body surface. There is a wide range of normal variation which depends in part on the physical training and general athletic capacity of the person tested. For this reason, serial determinations of vital capacity in the same person were regarded as more indicative of clinical progress than isolated determinations which are evaluated in terms of the so-called normals. Thus, repeated determinations were made in cases of mitral stenosis during pregnancy for early determination of the onset of congestive heart-failure, or to follow clinical progress of patients under treatment for heart-failure. Because of the wide range of normal, the multiple factors or diseases which may affect the result, and the superiority of other means of diagnosing and following the progress of heart-failure, vital capacity is rarely utilized as a measure of cardiac function.

Hemodynamic Measurements

Cardiac disease is associated with a variety of abnormalities in pressure and flow in the cardiovascular system. Except insofar as some of the associated abnormal hemodynamic measurements indicate cardiac failure, they cannot be regarded as tests of cardiac function in the sense of evaluation of the ability of the heart to cope with the various physical stresses of everyday living. The *circulation time* and *venous pressure* may be measured to confirm the presence of heart-failure and to determine whether both left-sided and right-sided heart-failure are present. By cardiac catheterization, the pressures in the chambers of the heart may be determined. Diastolic pressures of more than 5 mm. in the right ventricle indicate right ventricular failure, and diastolic pressures of more than 10 mm. in the left ventricle denote left ventricular failure.

Exercise Electrocardiogram as a Test of Coronary Reserve

The coronary blood flow normally increases above its basal value with exercise and other factors increasing myocardial requirements. This potential increase in coronary flow may be termed the coronary reserve. In advanced coronary atherosclerosis, aortic valvular disease and other conditions, the coronary reserve is reduced and an increased myocardial need for blood is incompletely satisfied, with resulting myocardial ischemia. Subjective evaluation of coronary reserve depends on a careful clinical history which discloses whether or not typical angina pectoris occurs during exercise or other circumstances which represent a coronary stress. In cases of angina pectoris (diminished coronary reserve), electrocardiograms made while the patient is at rest are frequently normal because coronary flow is adequate at rest and because there has been no cardiac damage. On the other hand, an electrocardiogram made during an episode of angina pectoris may disclose ST segment depressions, and similar depressions are in-

duced in patients with a history of angina pectoris while they breathe low oxygen mixtures. These observations, among others, suggested that the induction by exercise of ST segment depressions in patients with normal electrocardiograms at rest might indicate a diminished coronary reserve and confirm a diagnosis of angina pectoris.

The standardized two-step exercise procedure proposed by Master and associates[21,22] has been widely used as the stress, and the occurrence of an ST segment depression of 0.5 mm. or more represents a positive result. There is evidence that a depression of the ST junction of this degree with a rising ST segment is less significant than a depression of the entire horizontal or sagging ST segment (ischemic ST segment).[23] Leads II, V3, V4 and V5 are taken as rapidly as possible after completing the test. If results of the test are negative after the specified number of ascents in 1.5 minutes as indicated in tables according to age, sex and weight, twice the number of trips are made in three minutes (double two-step test), after a rest period or on a subsequent day. In a variable percentage of cases, there are both false positive and false negative results.

Obviously, the exercise stress does not reproduce the exact circumstances which induce angina pectoris in a given patient. There is considerable disagreement as to the amount of ST depression which should be regarded as abnormal. If the clinical history is taken carefully with respect to the quality, location and radiation of chest pain, the circumstances under which it occurs and its response to nitroglycerin, and especially if these queries are repeated after the patient takes the opportunity of making careful observations, the clinical diagnosis of angina pectoris is more accurate than that based on the exercise electrocardiogram. However, the objective test has merit as a confirmation of the clinical opinion and has statistical value when large groups of individuals are examined by a number of physicians for such purposes as insurance or military service. The exercise electrocardiogram is not useful as a test of cardiac function for the purpose of determining the individual's capacity for gainful work or other physical activity.

Summary

An evaluation of cardiac function is designed to determine the capacity of an individual to handle the stresses of the day, at home and at work, without experiencing cardiac symptoms.

In clinical practice, such an evaluation is useful to determine whether a patient can return to work after a cardiac illness and how strenuous is the work he can undertake. It is also helpful in determining indications for cardiac operations and in evaluating the effectiveness of such operations.

A subjective evaluation can be made by a careful history of the specific activities of an individual and the presence or absence of such symptoms as dyspnea, cardiac pain and fatigability in the course of such activities. The classification of the New York Heart Association is based on such subjective evaluation.

Objective tests are desirable in order to have quantitative measurements and comparable evaluations, and to eliminate subjective bias and differences in evaluation based on differences of medical skill and interpretation when the evaluations are made by different physicians.

Objective tests of cardiac function utilize some standardized stress such as exercise or anoxemia of measured degree, and the effect of this stress is observed with respect to some hemodynamic or ventilatory changes such as pulse, blood pressure, cardiac output, oxygen consumption and others.

In clinical practice, the simplest tests are those involving a fixed number of knee-bendings, hopping on one foot, or climbing stairs as in the two-step test. Pulse and blood pressure measurements are made before and after the tests. Normally, pulse and blood pressure return to control values within two minutes.

Other tests such as a physical fitness test based on standardized exercise (climbing steps or work on a treadmill or bicycle ergometer), a breath-holding test, tests involving the Valsalva maneuver, oxygen debt and ventilatory tests have also been described.

Most of the objective tests are too complicated for clinical use and normal values overlap the abnormal. Training factors and athletic ability influence the results. The pulmonary, muscular and nervous systems among others, as well as the heart, are important in determining the result of the tests.

The two-step exercise electrocardiographic test is designed as a test of coronary reserve. It has a good statistical correlation with the occurrence of angina pectoris but is not as reliable in the individual patient as a careful history and examination. It is not a test of cardiac function in the sense that has been defined.

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Obstructive Uropathy and Urinary Tract Infections in Children

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A combination of obstruction and infection constitutes over 90 per cent of the major urologic problems in infants and children. Early recognition of obstructive uropathy is essential for effective definitive surgery. In the wards at the Children's Hospital, there are always one or two cases of advanced lower urinary tract obstruction, with almost total destruction of renal parenchyma. In the more advanced cases, the ultimate prognosis is hopeless, irrespective of the type of definitive surgery performed. The extent of destruction of renal parenchyma is such that these children are urologic cripples who eventually outgrow their kidneys on attaining adulthood and die of urinary infection, uremia and hypertension.

The pyelogram and cystogram shown in figure 1 were made of a patient who is now 13 years of age. He first reported to our clinic at the age of 10. During the four years prior to that time, he had had recurrent attacks of urinary tract infection. The obstructive uropathy remained unrecognized for two years; in the succeeding two years, inadequate surgical procedures failed to correct the obstruction. He subsequently had multiple corrective surgical procedures and now has a permanent cystostomy. This patient is definitely a urologic cripple for whom the prognosis is almost certainly hopeless. Earlier recognition and relief of his obstructive uropathy would have led to a different result.

The majority of obstructions are architectural in nature and are due to congenital malformations. In many cases of obstruction, there is superimposed infection. Obstruction and infection produce a vicious circle. The ob-

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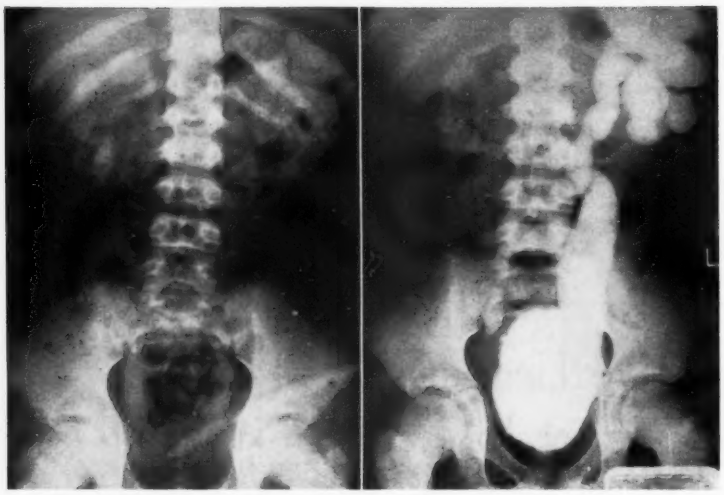

FIGURE 1a *(left)*. A 90 minute intravenous pyelogram showing extensive renal destruction with marked hydronephrosis and hydro-ureter. b *(right)*. Cystogram showing vesicoureteral reflux on the left with almost total destruction of left kidney.

struction predisposes to recurrent and persistent infection which, in turn, produces structural changes that aggravate the pre-existing obstruction. In addition, renal parenchymal destruction from obstruction is markedly accelerated by the presence of superimposed infection.

The causes of urinary tract obstruction may be classified roughly as either mechanical or dynamic, the latter causes being secondary to

FIGURE 2a. Marked hydronephrosis with fairly large extrarenal pelvis and ureteropelvic obstruction in a five year old child with right flank pain and pyuria.

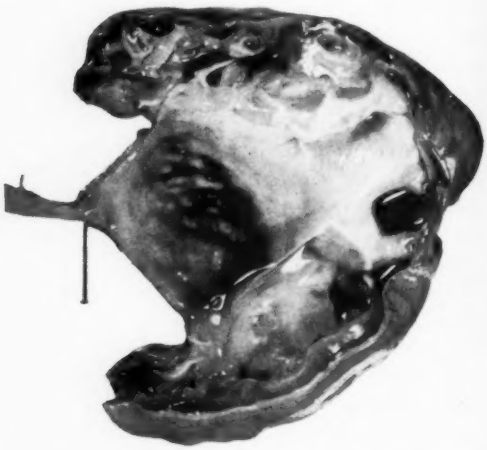

FIGURE 2b. Photograph of kidney at time of surgery. Large vessels going directly across the ureteropelvic junction are producing obstruction. Because the vessels supplied such a large portion of the kidney, it was necessary to cut the ureteropelvic junction and reimplant the ureter in the renal pelvis. Excellent clinical results were obtained.

FIGURE 3a. Large mass in the left flank of an 11 month old infant. Anterograde pyelogram shows large hydronephrosis with ureteropelvic junction obstruction.

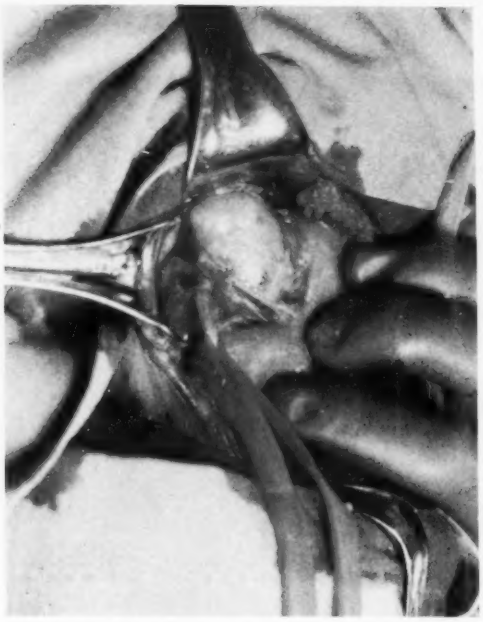

FIGURE 3b. Complete destruction of renal parenchyma due to congenital stricture at ureteropelvic junction.

FIGURE 4. Huge hydronephrosis and hydro-ureter on the left due to congenital ureterovesical stricture. The patient was a 26 year old man admitted with marked sepsis characterized by high fever and general prostration. The urine was loaded with white blood cells and bacilli. Intravenous pyelograms showed normal right kidney and ureter. Nephro-ureterectomy obtained excellent results.

FIGURE 5. Typical x-ray appearance of ureterocele. This patient had occasional attacks of fairly typical right renal colic. Note cobra-head deformity at lower end of right ureter.

FIGURE 6a *(left)*. Extensive dilatation of colon in patient with Hirschsprung's disease. b *(right)*. Extensive dilatation of both ureters and kidney pelves. There is no obstruction at either ureterovesical junction. Huge, dilated, flabby bladder is carrying a large residual. Bilateral hydronephrosis is a frequent complication of Hirschsprung's disease.

neurogenic disease. In his "Clinical Pediatric Urology," Campbell has listed some 32 causes of obstruction. I shall discuss the more common ones, beginning with those of the upper urinary tract and progressing downward.

Ureteropelvic obstruction, producing hydronephrosis, is usually secondary to either stricture of the ureteropelvic junction or aberrant renal vessels (figures 2 and 3).

The more common causes of ureterovesical obstruction are stricture, ureterocele and intrinsic neurogenic disease (Hirschsprung's disease or megalo-ureter). Although stricture of the ureterovesical junction may be bilateral, fortunately, it is more likely to be unilateral; therefore, the ultimate hopeless prognosis which occurs with vesical neck obstruction does not obtain in such cases. Stricture may

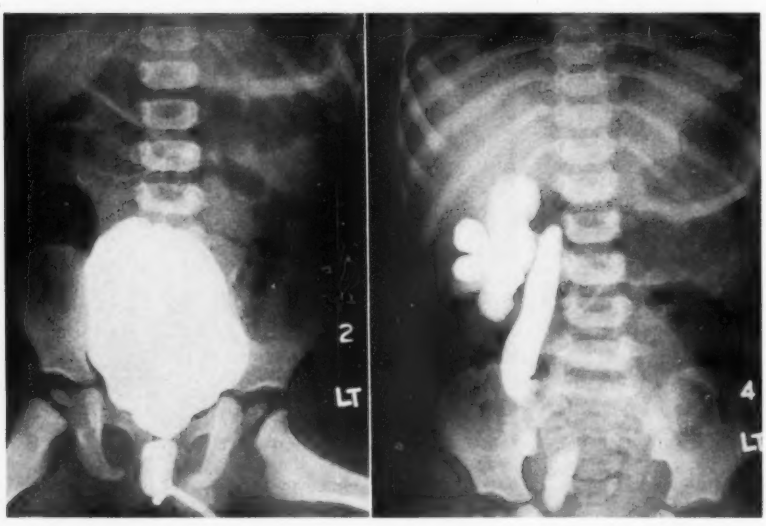

FIGURE 7a *(left)*. Cystourethrogram showing large, dilated bladder with definite contracture at vesical neck in a two and one-half year old child. Patient strained on urination and complained of discomfort with the frequent passage of small amounts of urine. There was 200 cc. of residual urine. b *(right)*. Hydronephrosis and hydro-ureter on the right with ureterovesical reflux. The left ureter was also dilated. Transurethral resection of bladder neck was performed with excellent clinical results. Over a two and one-half year period, there has been a diminution in hydronephrosis and hydro-ureter, with normal chemistries and no evidence of infection.

FIGURE 8a. Intravenous pyelogram of a four and one-half year old child with meningomyelocele. The patient had had repeated bouts of urinary tract infection and urinary retention. Residual urine measured 90 to 125 cc. There were no prospects of neurogenic improvement.

FIGURE 8b. Cystogram showing vesicoureteral reflux on the right.

FIGURE 8c. Intravenous pyelogram taken one year after ileocystostomy. The child has developed normally, with no upper urinary tract difficulties.

remain silent and produce no symptoms until infection supervenes, as is shown in figure 4. Ureterocele, which frequently is bilateral, may produce upper tract dilatation and urinary stasis (figure 5). Intrinsic ureteral disease consists primarily of the so-called idiopathic megalo-ureter and those ureteral conditions accompanying Hirschsprung's disease (figure 6). Theoretically, both of these conditions are due to either a failure of ureteral musculature development or an absence of nerve ganglia in the bladder about the ureterovesical junction.

Vesical neck obstruction is caused primarily by contracture of the bladder neck; neurogenic bladder, which occurs frequently with spina bifida; or congenital urethral valves. The latter occur so rarely that no further discussion is indicated. Examples of vesical neck obstruction and neurogenic disease are shown in figures 7 and 8.

Congenital urethral stricture is rare; meatal stenosis is the most common congenital malformation in male children. It may be aggravated by phimosis with subsequent balanitis. It should be emphasized that congenital meatal stenosis may ultimately produce serious renal damage if permitted to persist.

In order of frequency, indications of obstruction at the ureteropelvic junction of the kidney are as follows: pyuria, pain, hematuria, palpable mass, gastrointestinal symptoms, hypertension and uremia (late, bilateral). Persistent or recurrent pyuria, with or without fever, should always suggest the possibility of obstructive uropathy. Although progressive hydronephrosis may be painless, renal colic is usually present. Hematuria may be accompanied by pyuria and is not pathognomonic of upper tract obstruction. In small children, the first finding may be the discovery of a mass in the kidney region. Occasionally, the

presence of this mass is intermittent, creating some difficulty in diagnosis. Of course, the differential diagnosis of a mass in the renal region lies between kidney tumor and hydronephrosis. Gastrointestinal symptoms, such as vague upper abdominal discomfort and recurrent attacks of nausea and vomiting, may be the only presenting symptoms. Hypertension occasionally occurs with either bilateral or unilateral obstructive uropathy and, fortunately, responds fairly well to corrective surgery. Uremia occurs late in the disease when bilateral renal involvement is present.

The symptoms of bladder neck and urethral obstruction are frequency; hesitancy; small, slow stream; enuresis; urinary retention, which occurs occasionally; and the presence of a suprapubic mass. Frequently, the mother will observe that the child stands and strains to urinate. She also may notice a small, weak stream in the male child.

The diagnosis of obstructive uropathy is primarily based on the awareness of the possible presence of obstruction. In all cases of persistent or recurrent pyuria, the presence of obstructive uropathy should be suspected whether or not fever or pain is present.

I have adopted the following routine as a basis of examination in all children in whom obstructive uropathy is suspected: (1) physical examination and microscopic urinalysis; (2) residual urine determination with urine culture and drug sensitivity tests on the catheterized specimen; (3) cystogram, immediate and delayed (the presence of ureterovesical reflux is highly suggestive of obstructive uropathy at the bladder neck); (4) intravenous pyelography; and (5) cystoscopic investigation when indicated. Retrograde studies should be deferred until the other diagnostic methods have been utilized. There is no reason why the average physician cannot establish an accurate diagnosis of urinary tract obstruction without the services of a urologist.

It is well to remember that pyelitis in childhood is often a precursor of serious kidney disease in adulthood. If pyelitis is not cured, it is because of the failure to recognize and correct the obstruction and to eradicate infection completely. Since the advent of broad-spectrum antibiotics, it is possible to eradicate urinary tract infection, at least temporarily, leaving behind a persistent obstructive uropathy which leads to progressive kidney destruction. This fact must be constantly kept in mind in dealing with urinary tract infections in children. A single bout of pyelonephritis in the male child and two attacks of pyelonephritis in the female child demand careful urologic investigation. The minimal urologic work-up in these circumstances should consist of physical examination, residual urine determination and intravenous urography. If this procedure is followed, many of the hopeless urologic cripples whom we see today will receive earlier definitive corrective surgery, which will result in a definite improvement in the ultimate prognosis.

Newer Aspects of the Treatment of Diabetes Mellitus

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In 1942, a group of French physicians, while searching for a sulfonamide that would be effective in the treatment of typhoid fever, came on a sulfonamide preparation that produced hypoglycemia. Further extensive and fundamental work done by Loubatieres[1] in the Institute of Biology at Montpellier, France, has given medicine a new tool with which to manage the patient who has diabetes mellitus. The historical background of oral substitutes for insulin has been reviewed by Goldner.[2]

The release of tolbutamide for the treatment of diabetes mellitus after 18 months of clinical trials in this country is a tribute to the effectiveness of our great American centers of medical research and education in evaluating this preparation for clinical use. In considering the use of this drug in the clinical management of diabetes mellitus, it is important to remember that the mechanism of action of the sulfonylureas CARBUTAMIDE® and tolbutamide in this disease is not totally understood. However, some basic facts are available which aid us in the determination of their clinical use.

Action of Sulfonylureas

The beta cell of the pancreas is stimulated to release insulin, and the hypoglycemia that is observed is due to the released insulin. There is no effect of the usual doses of sulfonylurea in the totally depancreatized dog. Cox and co-workers[3] gave Carbutamide to a totally depancreatized patient. No hypoglycemic effect was noted; furthermore, the patient's in-

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sulin requirement was not lowered when the oral drug and insulin were administered simultaneously. The Drs. Colwell[4] injected small amounts of sulfonylurea directly into the pancreatic artery. Their results indicate that this agent acts by a pancreatic mechanism, probably by accelerating release of insulin from beta cells.

Wrenshall and Best[5] have shown that oral sulfonylurea administered alone is effective in returning blood and urine sugar levels toward normal only in those diabetic human subjects who possess a source of appreciable amounts of endogenous insulin. Mirsky and his group[6,7] have intensively studied the enzyme system which leads to the inactivation and degradation of insulin, a system called insulinase. They believe that in addition to stimulating the beta cells of the pancreas, sulfonylurea inhibits the insulinase in vitro and in vivo and causes a consequent decrease in the rate of insulin destruction.

Contraindications to the Use of Sulfonylurea

I would like to stress that there are certain situations and cases in which sulfonylurea should not be given.

Youthful diabetic patients—Mirsky, Diengott and Dolger[7] have shown that, with very few exceptions, patients in whom diabetes mellitus develops by the time they are 20 years old are not suitable subjects for therapy with oral sulfonylurea.

Labile diabetes—Patients who require large or multiple daily doses of insulin are unlikely candidates for this drug. Its use is not indicated for a patient who exhibits a rapid onset of acetonuria under somewhat stressful situations, such as a mild fever or trauma, or acetonuria as a result of emotional stress.

Acute complications—The drug should not be given in the presence of acute complications of diabetes. According to our present knowledge, insulin is the best means of regulating patients who have acute infectious processes or are to undergo physical trauma such as surgery.

The unreliable patient—Sulfonylurea should not be administered to patients who are unreliable in their diabetic management and who will seize this new discovery as the miracle drug which will free them from dietary control and medical supervision. Nor should this drug be recommended for the patient who cannot be trusted to use the pills as directed.

In clinical practice we all usually find patients who will indiscriminately take varying amounts of the pills to cater to their whims for foods which are highly satisfying. Although such patients are more reluctant to take an extra injection of insulin, they occasionally will do so.

Recommended Usage of Sulfonylurea

Keeping in mind the preceding precautions, we may now consider those patients who may be given a clinical trial with oral sulfonylurea. Dolger has reported his experience with more than 500 patients in private and clinical practice. Patients in whom diabetes develops after they are 30 to 40 years of age comprise 95 per cent of the diabetic population. Of these patients, 75 per cent will respond favorably to oral sulfonylurea. Usually, they have had the disease only a short time and have used either no insulin or less than 30 units per day. Dolger has shown that in clinical practice it is not necessary to use a screening test, that is, to know the blood sugar response to a single dose of the drug. As a result of his experience, he believes that even the duration of the diabetes mellitus does not have to be taken into consideration when giving the patient a trial of this oral preparation.

A report prepared by the Informational Committee on Oral Hypoglycemic Compounds of the American Diabetes Association[8] adequately presents the method of giving tolbutamide to patients. The following is an excerpt from this report, succinctly stating the necessary information:

"Tolbutamide is most effective in adult patients with relatively mild diabetes who have required small to moderate doses of insulin. The best test for responsiveness is the administration of the drug for a period of seven days during which insulin is withdrawn gradually and tests of the urine for glucose and ketone bodies are performed three times daily.

"The dosage of tolbutamide and the method of attempting its substitution for insulin varies with circumstances. Ordinarily, 3 gm. of the drug is given on the first day, 2 gm. on the second, and 1 gm. on the third. This method of initiating treatment is applicable whether the patient has been using insulin or not. Maintenance is provided by divided doses totaling from 0.5 gm. to 1.5 gm. (never more than 2 gm.) daily and must be determined on the basis of experience in each case.

"Insulin should never be withdrawn abruptly. In cases in which the previous daily requirement has been less than 30 units, initiation of treatment with tolbutamide may be accompanied by a simultaneous reduction of 30 to 50 per cent in the dose of insulin, further reductions being made gradually so long as levels of blood and urinary glucose remain satisfactory. Patients who have required more than about 30 units daily may reduce their dose by 20 per cent on the first day of tolbutamide therapy, further reductions being made very cautiously. In daily observation the development, at any stage, of sustained hyperglycemia or glycosuria or any sign of ketosis calls for the abandonment of oral therapy and prompt reversion to maintenance doses of insulin. If the blood sugar remains within reasonable limits, however, oral treatment may be continued, the patient returning for examination at weekly intervals for the first month, then at two-weekly and finally at monthly intervals. The periodic examination should include a urinalysis for glucose and ketone bodies, determination of the blood sugar, and a white blood cell count, with a differential count if the latter is low. Determinations of serum alkaline phosphatase and BROMSULPHALEIN® excretion seem the most sensitive tests for suspected hepatic damage.

"If not hospitalized, the patient must test the urine at home, informing the physician of any increase in glycosuria. He must be made to understand that close adherence to diet is just as important as when insulin is used.

"The patient should be warned about the possibility of hypoglycemia while both insulin and tolbutamide are being taken during the period of stabilization. Combined therapy with both agents for purposes of maintenance is pointless."

In clinical practice we have found that hospitalization is not necessary to initiate this program. The patient is given his individual dietary prescription and instructed to examine his urine for sugar and acetone before meals; however, he should empty the bladder one-half hour before meals, drink a glass of water, and void again just before eating. It is this second specimen which has guided us in decisions regarding divided doses of tolbutamide. The patient is instructed to weigh daily.

The patient also is informed of the side reactions of the drug, namely, gastrointestinal symptoms, dermatitis or headaches. These have occurred in approximately 3 per cent of patients. Gastrointestinal symptoms have been relieved in some patients by giving the tablets postprandially. Some patients also have complained of marked facial redness after the ingestion of alcoholic beverages while taking sulfonylurea; some even have reported intolerance to alcohol.

The intense action of the drug in the first week is succeeded by a decreased intensity in the second or third week; an increase in medication may be necessary. However, the drug does not have the flexibility between dose and action which is known in the use of insulin. Instead, there seems to be a minimum effective dose. However, this conclusion needs further exploration.

Caution

We do not know the effect in the total organism of long-term use of a sulfonamide preparation. Sulfonamide drugs have been implicated in collagen disorders. However, tolbutamide does not have the para-amino group in it which seems to be responsible for sensitivity reaction. At the present time there have been no reports of this sensitivity. We must keep in mind that our experience with this preparation is still limited.

Liver damage has been mentioned as a possible mechanism of hypoglycemia. Sherry, in a report published in *Metabolism*, gives data showing that no detectable liver damage results from the use of tolbutamide.

We know that the normoglycemia produced by insulin affects the blood lipids, lipoproteins and glycogen storage. Will the normoglycemia produced by tolbutamide also have this effect?

It is important to keep instructing patients in the use of insulin technic in addition to the use of oral pills, so that in urgent and emergency situations the use of insulin will not be foreign to them.

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Postgraduate Clinical NOTES

90. SIGHT AND HEARING OF THE BABY

The sign that a baby *sees*—in the full sense of the word—is that he looks at and shows recognition or appreciation of the target of his looking; the sign of *hearing* is that he turns toward and reacts to a significant sound whose source he cannot see. Testing sounds should be soft—a quiet, familiar voice, a food-preparing sound—the tap of a spoon against cup or feeding bottle—and in our general examination of a four or six months baby we should test the hearing in this way, as we test the sight with a toy, torch, handkerchief or familiar face. A single, unmistakable response is proof of hearing but if there is none we must be patient and test further with bell, drum, rattle, pitch-pipe, mouth organ or whatever we have, not forgetting that a sensible babe will see no point in vain repetitions but will get bored and disregard our pranks. We must have patience and continue when he feels fresh again, until we can form a reasonable estimate of his hearing. If he is indeed deaf then it is our special province to persuade his parents to accept whatever is proven fact—but no more. All is not lost, neither has this babe sinned nor his parents—it is no one's fault, and we can tell them with confidence that almost certainly some hearing is present, because it almost always *is*, though none may be immediately detectable. They must have faith and act on it, not by collecting a dozen "independent opinions" or by looking for surgical, medicinal, electrical or manipulative *cures* but by seeking and obtaining expert auditory training as soon as it can be had and above all by talking to the babe. They must talk distinctly, repetitively and often, casting the bread of words and phrases on the waters to find it in the child's speech after many days. There is, I understand, no substitute for the mother's voice, speaking into the ear at the acceptable time, which ends at three years old.

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Current Trends in the Treatment of Cancer

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CANCER remains one of the most serious diseases affecting mankind, causing more deaths than any other illness except heart disease. In the United States, there are about 450,000 new cases of cancer each year; it causes approximately 250,000 deaths, which represent about one-sixth of the total death rate. The disease is fairly common in children, resulting in 4000 deaths each year in children less than 15 years of age; about one-half of these deaths are due to leukemia. Only trauma accounts for more deaths in children. The most common malignancy in men is cancer of the skin; in women, it is cancer of the breast. Improvement is being made in the results of treatment, as is shown by the relatively stationary number of deaths from cancer during the past few years, in spite of the increase in population. The incidence of the various types of cancer fluctuates slightly from year to year, but the incidence of carcinoma of the lung, as well as the number of deaths caused by it, have increased sharply during the past 10 or 15 years. In 1956, there were approximately 29,000 deaths from this disease; this is six times the number of deaths attributed to cancer of the lung 20 years ago.

Mechanisms Which Spread Cancer and Their Relationship to Treatment

There are four mechanisms by which malignant disease spreads: (1) the lymphatics, (2) venous emboli, (3) implantation of cells and (4) contiguity. But the role of each mechanism varies considerably in different types of tumors. For example, sarcomas metastasize by venous emboli but not by way of the lymphatics, whereas tumors of the oral cavity and

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neck metastasize primarily by the lymphatics but not by venous emboli. Many tumors, such as carcinoma of the breast and of the lung, metastasize actively by both mechanisms. All malignant tumors spread to varying degrees by contiguity and implantation. To a certain extent, the mechanism of spread of the tumor influences the type of therapy indicated.

Lymphatic spread—Numerous authors have emphasized this mechanism of spread. Based on this knowledge, Handley and Halsted devised operations which have resulted in the radical resection practiced today. The primary principle in the modern operation for cancer is wide resection of the tumor, with removal of as much of the lymphatic tissue and nodes draining the area as possible. This extension of the operation to include wide resection of lymph nodes has considerably improved the results.

Spread by venous emboli—Although pathologists have called our attention to this mechanism of spread for many years, surgeons have not paid sufficient attention to it. Heeding the action of this mechanism is most important, because it is the actual cause of the patient's death. It is true that treatment of venous metastases once they develop is not very effective, but much can be done to prevent them.

By microscopic study, Grinnell[1] found invasion of veins in the tumor in 36 per cent of patients with carcinoma of the rectum and in 33 per cent of patients with carcinoma of the colon. Brown and Warren[2] found venous invasion in 61 per cent of patients with rectal carcinoma; the fact that the specimens studied were obtained at autopsy accounts for the higher incidence. In 1954, Cole, Packard and Southwick[3] reported finding malignant cells in the venous blood draining from the area of the tumor located in the rectum and colon. After studying a series of specimens, Fisher and Turnbull[4,5] reported that the incidence of positive cells in the venous blood was 28 per cent when colectomy was performed by the usual technic, but only 13 per cent when it was performed without handling the tumor during the operation other than to determine operability. Engell[6] made an extensive study of cancer cells in the blood stream and found cancer cells in the venous blood draining from the tumor in 54 per cent of 76 patients with cancer of the rectum and in 70 per cent of 31 patients with cancer of the colon. In this series, he found no cancer cells in patients with grade 1 tumors, but found them in 35 per cent of patients with grade 2 tumors, in 78 per cent of patients with grade 3 tumors, and in 100 per cent of patients with grade 4 tumors. He reported finding cancer cells in the peripheral blood in 10 of 79 patients with operable cancers, and in 7 of 14 patients with inoperable tumors. Moore, Sandberg and Schubarg[7] also have reported extensive studies revealing cancer cells in the circulating blood of patients with cancer. The frequency with which carcinoma spreads by venous invasion led us[3] to adopt ligation of the vascular trunks.

Implantation of malignant cells—One of the first surgeons to realize the danger of implantation of cancer cells during an operation and to suggest corrective and preventive measures was Ryall.[8,9] He recognized the danger of spreading cancer cells by a biopsy, and recommended change of instruments, drapes, etc., before operation is resumed after biopsy.

The danger of possible implantation of cancer cells in the tissues during an operation was forcibly impressed on us when we noted a high rate of recurrence in the suture line of patients on whom we had performed a resection of the colon. A study[10] of 55 patients who had had resection of the colon for carcinoma revealed local recurrence at the suture line in 10.9 per cent of cases in such a manner as to suggest implantation during the operation as the cause. A few years later, we enlarged the series[11] to 114 cases and found a similar incidence of local recurrence (9.9 per cent). As a result of these findings, we advised ligation of the bowel several inches above and below the tumor before any operative manipulation was begun. To a certain degree, smears taken from the lumen of the bowel support our suspicion that contamination of the cells is a cause of the local recurrences, and that ligation of the lumen might prevent or minimize their development. Smears taken in the surgical pathology room from outside the ligatures one to two

hours after their application revealed no demonstrable cells. Smears taken inside the ligatures at the proximal end were positive in 42 per cent of cases; at the distal end, they were positive in 65 per cent of cases.[12] This indicated that the hour and a half intervening between application of the ligatures in the operating room and the procurement of the smears had resulted in death of the desquamated cells. The presence of cells inside the ligatures suggested that cells were being desquamated or dislodged from the tumor and were moving into the lumen of the bowel continuously during the operation; some were so recently dislodged that they stained.

Actually, the relationship of implantation of cells to local recurrence at the suture line was first brought to our attention by Morgan and Lloyd-Davies.[13] Data presented by Black and Kelly[14] support the contention that implantation may cause local recurrence in colonic surgery for cancer. They studied 116 cases of recurrence following resection of the upper rectum for carcinoma. In 55 of the 75 cases in which the location of the recurrence could be determined, it had developed clearly at the site of anastomosis. They concluded that implantation seemed to be the most logical explanation of the recurrences in fully 75 per cent of the cases. In a study of 98 local recurrences in the colon following anterior resection, Lofgren and associates[15] concluded that three were due to incomplete excision of the tumor, and 12 to incomplete excision of lymphatic or vascular permeation. In the 76 remaining recurrences there was no explanation other than possible implantation, which, however, could not be proved.

Hilberg, Smith and associates[16] have emphasized the danger of implantation. Malignant cells were found in 34 per cent and doubtful cells in an additional 18 per cent of washings from wounds in 101 patients who had radical operations for cancer. In a small series of 10 cases which revealed local recurrence at the suture line following resection of the colon for cancer, Fleischner and Berenberg[17] found a silk suture in the center of the tumor in three cases, indicating that the cells may have been dragged into the wall of the bowel by sutures used in the anastomosis. The presence of a silk suture in the central part of the tumor also has been observed by Ackerman and Wheat,[18] who have reported numerous types of local implantation, some which they observed and some which were examples from the literature.

Extension by contiguity—Practically all malignant tumors spread by this mechanism, some faster than others. Likewise, all types of tissue can be invaded. If vital tissue is located adjacent to the tumor, it may, of course, be invaded. However, tumors which invade adjacent tissue with formation of bulky tumors are not necessarily hopeless tumors. Accordingly, invasion of contiguous tissue is by no means a contraindication to excision as long as vital tissue necessary for life is not involved.

Prevention of Dissemination of Cancer Cells

If there is any question concerning the validity of dissemination of cancer cells, all doubt can certainly be eliminated by recalling that death from cancer usually takes place because of dissemination. We must exert all possible effort to prevent dissemination of cancer cells (figures 1 and 2).

FIGURE 1. Implant in a scar of a radical mastectomy, first noted over four years after the operation. The implanted cells apparently had lain dormant for almost this length of time, presumably checked by host resistance. It is barely possible that currently used anticancer agents might destroy these cells if used at the time of implantation or shortly thereafter.

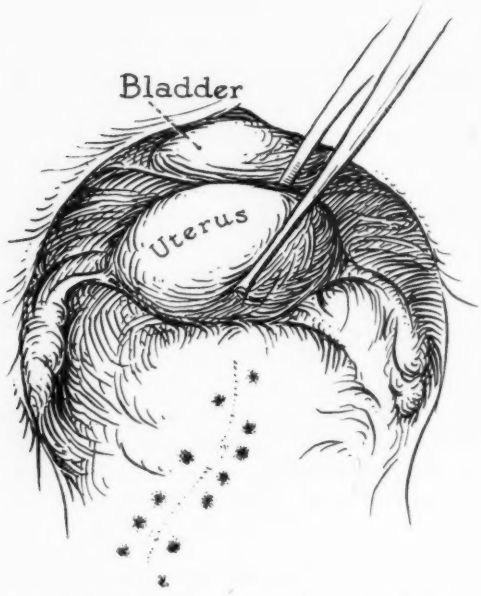

FIGURE 2. Small implants in the peritoneum of the pelvic floor at points where the needle had penetrated in closing the wound after a Miles operation, revealed five months after the operation when the colostomy was being revised. This procedure also disclosed numerous small implants which had seeded on the peritoneum of the lower abdomen before the operation and probably could not have been prevented unless irrigation with some anticancer agent might have killed them. However, the implants in the suture line could have been avoided by more careful technic and perhaps with the additional precaution of irrigating the peritoneal cavity with an anticancer agent.

(Reproduced from COLE ET AL.: The dissemination of cancer cells. To be published in the *Bulletin of the New York Academy of Medicine.*)

When patients with cancer are examined, *this examination must be carried out very gently* lest palpation alone dislodge cancer cells by way of the lymphatics and veins. A very serious error made by surgeons is to use soap and water in preparing the skin of patients with cancer, particularly when the tumor is palpable, as in cancer of the breast. When the tumor is superficial, one of the many effective antiseptics should be painted gently on the skin; scrubbing should be avoided. When the tumor is located in the peritoneal cavity and becomes ulcerated, seeding may take place at any time.

Careful technic during the operation can avoid or minimize dissemination of cancer. After performing a biopsy immediately preceding an operation for cancer, it is a well-established routine to change gloves, drapes and instruments. When doing the resection for cancer, the surgeon must make all possible effort to keep his line of incision as far from the tumor as possible, so that he can minimize spillage of cancer cells from sectioned lymphatic channels or veins draining from the tumor into the wound. The study made by Hilberg, Smith and associates emphasizes the fact that even though the surgeon thinks he is completely around the tumor with his excision, he may have cut across lymph channels or veins which are contaminated by cancer cells. When a surgeon is operating on an ulcerating tumor which is continuous with the operating field, serious effort must be made to destroy the cancer cells on the surface of the ulcer. A good example of this situation is the radical operation for tumors of the oral cavity. In such circumstances the surface of the cancer should be treated in such a way as to kill the surface cells. Although escharotic agents may be effective, it is possible that heat with an actual cautery may be more effective. It is well known that recurrences following radical operation of the neck for cancer are very common. We believe that most of these local recurrences are best explained on the basis of implantation.

To prevent or minimize local implantation of cells in the suture line of patients having resection of the colon for carcinoma, we have advocated ligation of the lumen several inches above and below the tumor as soon as operability is determined but before operative manipulation is started.[3, 10]

The spread of cancer by way of venous emboli represents the most lethal phase of the malignant invasion of the tumor. This takes place at varying times in different tumors. Theoretically, if cancer cells are found in the peripheral blood of patients with cancer, the lesion should be incurable (figure 3). We are not sure this is true; it is possible that host resistance can kill some of those cells. The growth or death of these cells is probably determined by the number of cells and the degree of host resistance. At any rate, this question is an important one, related to prognosis

and to therapy, since during an operative manipulation we no doubt break loose cells which migrate centrally as cellular venous emboli. We should be as gentle as possible in an operative manipulation, so that these cellular emboli are avoided or minimized. To avoid possible spread by the venous emboli, we have adopted the procedure of ligating as many vascular trunks as possible leading to and from the tumor areas before starting an operative manipulation.[3]

After completing an operation for cancer, many but not all surgeons irrigate the wound with saline to wash out loose cancer cells. It would appear that this should be done wherever possible. However, at the present time, we do not have information to indicate what solution should be used. In our laboratory we are conducting an extensive animal experiment consisting of washing out wounds inoculated with tumor cells (Walker 256 carcinosarcoma) with numerous agents in an attempt to discover which agent or agents may be more effective than ordinary physiologic saline. Data are not yet available, but it already appears that physiologic saline is a poor agent.

Types of Treatment

Up-to-date surgery and radiation are the only methods of treatment which result in the cure of cancer.

Surgery—At the present time, surgery is the most effective method of treating cancer, and, during the past several years, there has been much improvement in the operative procedures involved. The most important of the factors concerned include improvement in assay of operability and in anesthesia, correction of physical decrements, and increase in extent of operation. Further improvements by extending the limits of resected tissue cannot be expected, since an increase would involve the excision of vital structures necessary for life. Only mild or slight improvement may be expected in each of the other three factors. Nevertheless, there are innumerable precautions which we could take to improve our surgical results.

Assay of operability—One of the most common and serious mistakes competent surgeons make is to err in their interpretation of operability. Too often, the surgeon becomes blind to the danger of operation by saying to himself that the only possibility of curing a patient is by surgery, and that he must therefore operate without delay. It is obvious that the best operation designed by man is of no value to the patient if the patient does not survive the procedure. We *must make more effort* to assay the patient's operability correctly, in order to avoid or to effectively minimize postoperative fatalities resulting from inaccurate interpretation of the patient's physical reserve. We can often correct certain decrements after

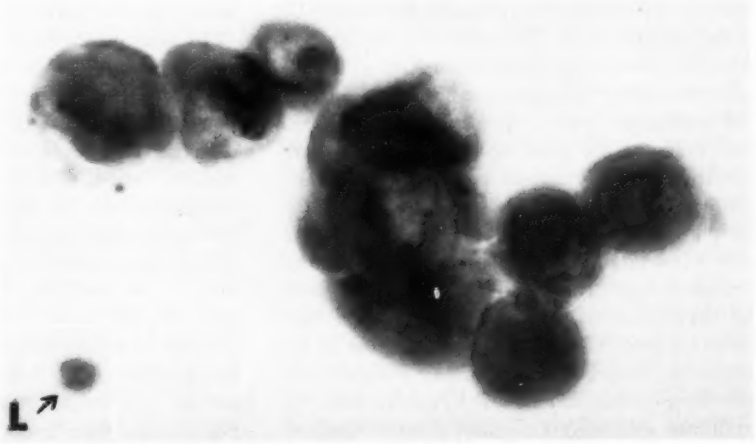

FIGURE 3. Malignant cells found in the blood of a patient with carcinoma of the breast. The blood sample was obtained from the antecubital vein preoperatively. The small cell (L) (*inset*) (Papanicolaou's stain X 1100) is a lymphocyte.

a few days' therapy and then perform the operation safely. On other occasions we may be able to carry out surgical therapy safely in a frail patient by staging or modifying the operation.

Correction of physical decrements—Obviously there are dozens and even hundreds of complications and decrements which may afflict the patient. Although we cannot discuss all of these, two of them are so important that they are worthy of individual attention.

Over half of the patients with carcinoma who come to our wards at Illinois Research Hospital have from a mild to a severe degree of malnutrition. This decrement is found more often in elderly people than in younger groups, primarily because appetite dwindles with old age and because dental defects are so common. With sufficient proteins the malnutrition often can be corrected sufficiently within four or five days to make operation safe. Because of his disease, the patient may have lost 25 to 30 lb. in weight during the preceding several weeks. However, to obtain safe operability, it is not essential that he gain back the entire amount of weight lost; in most instances, a gain of 4 or 5 lb. is sufficient. Fortunately, nature will put this weight in the organs where it is most needed. Fat itself is of no value in protecting the patient against the possible fatal consequences of an operation; in fact, it is usually a handicap. Accordingly, under optimal conditions, malnourished patients should show a nutritional gain before a major operation for cancer is performed. Feeding by mouth is, of course, the most effective mechanism of correcting malnutrition. Often, we are able to correct malnutrition merely by putting the patient on a good diet and urging him to eat. Perhaps the most serious phase of malnutrition is hypoproteinemia, which may be indicated by a low blood protein level, particularly albumin. However, we wish to emphasize that a low blood protein is actually a late indication of hypoproteinemia, and therefore may be very misleading. We can appreciate this when we realize that during protein loss or inadequate intake, the human body will pull protein from stores in various organs in order to maintain a relatively normal protein level of the blood, which is so important in preserving normal osmolarity.

If the patient is unable to eat more than 500 to 1000 calories per day because of partial intestinal obstruction, ulceration in the gastrointestinal tract, etc., it is often possible to achieve improvement in the nutritional status by the addition of intravenous feedings, which alone will barely maintain nutritional balance. Often maximal oral intake is accomplished best by inserting a small soft plastic catheter through the nose into the stomach and feeding the patient by drip with fluids of high caloric content, particularly protein. It is usually desirable to give most of this feeding at night so that it will not destroy the appetite for regular meals. The patient should be encouraged to eat three meals a day with the catheter in place, even though he may be able to ingest no more than 200 calories per meal by this route. By giving 2000 to 3000 cc. of glucose and AMIGEN® per day, in addition to the oral intake, the caloric intake may be bolstered to the point where nutritional balance and safe operability can be attained. In the very near future, the addition of fat emulsion may make it possible to obtain nutritional balance with intravenous fluids and a very low oral intake. One of our well-known pharmaceutical houses is perfecting a fat emulsion which is relatively free from reaction and is metabolized by the patient. If this emulsion can be made available for general use, one of our major problems in malnutrition and operability may be solved.

In elderly patients, cardiovascular disease represents one of the most important complications or decrements. Mild cardiac decompensation often exists without serious cardiac damage; in other words, with bed rest, proper diet, diuretics, digitalis, etc., this mild decompensation and its effects can be eliminated. The improvement in this condition alone may reduce the expected mortality rate from 20 to 4 or 5 per cent. Coronary thrombosis is so common and so serious that it is a very important complication from the standpoint of the mortality rate following operation. If the patient has had an attack of coronary thrombosis within three months of the expected time

of operation, there is great danger that the patient will not survive an operation. If the attack has occurred within a few weeks preceding operation, the patient is apt to die on the operating table. However, if three or four months have elapsed since the coronary thrombosis, the patient will usually survive the operation about as well as a patient of the same age without coronary thrombosis, providing complications have been eliminated or can be avoided.

In our effort to determine operability from the standpoint of cardiac function, we do not find the electrocardiograph to be of much value other than to tell us that cardiac disease of some sort is present. We usually get more information from single questions such as the following: (1) How far can you walk without resting? (2) How many stairs can you climb without resting? (3) Can you sleep lying down flat? (4) Do you have shortness of breath while at rest?

Radiation—There are numerous types of radiation currently in use. X-ray therapy (commonly 250,000 to 400,000 electron volts) and radium are used most frequently. Carcinoma of the lip and of the cervix and Hodgkin's disease are particularly susceptible to radiation therapy. The betatron (up to 20,000,000 V) and the linear accelerator (up to 50,000,000 V) promise to be valuable in deep-seated tumors, because intensive therapy can be delivered at great depth without the danger of skin damage. The cobalt bomb is very effective, and its use is increasing.

Isotopes—With the introduction of isotopes several years ago, we had great hopes that a very effective method of treatment had been discovered; however, they have been disappointing. Of the various isotopes, radioactive iodine (I^{131}) is the most popular. However, its use is limited to carcinoma of the thyroid and it cannot be considered very effective, since no more than 25 per cent of cancers of the thyroid will pick up iodine even when stimulated by TSH (thyroid-stimulating hormone). Gold (Au^{198}) is used in the treatment of cancer of the prostate and in the peritoneal cavity after operation for certain intra-abdominal cancers, such as in the ovary, which tend to seed into the peritoneal cavity. Phosphorus (P^{32}) is used in the treatment of leukemia and carcinoma of the breast. Numerous other isotopes, including cobalt (Co^{60}), tantalum (Ta^{182}), iridium (Ir^{192}) and bromine (Br^{82}) are being used, but only experimentally.

Drugs—Although dozens of drugs have been reported as beneficial in the treatment of cancer, none of them have effected a cure. Perhaps the first effective drug reported was nitrogen mustard, the beneficial action of which was reported by Goodman, Gilman and associates.[19] Their original report indicated that nitrogen mustard was effective in the treatment of certain diseases, particularly Hodgkin's disease, lymphosarcoma and leukemia. Since then, it has been shown that regression of carcinoma of the lung frequently can be obtained with nitrogen mustard. For example. Hatch, Bradford and Ochsner[20] reported that in 198 patients with bronchogenic carcinoma symptomatic relief was obtained in 40 to 50 per cent. They noted that although no response might be obtained with the first course of therapy, a second or third course might be beneficial. Nitrogen mustard is occasionally effective in diminishing effusion in the pleural and abdominal cavities due to metastatic carcinoma. For example, Weisberger[21] reported that the drug benefited 56 of 88 patients with pleural and peritoneal effusion; in 43 patients there was no reaccumulation of fluid.

Bateman and Carlton[22] have reported that subjective improvement was noted in the majority of 122 patients with carcinoma treated by Thiotepa. These subjective manifestations consisted of improvement in appetite, weight gain and relief from such symptoms as cough, pain and dyspnea. The duration of improvement averaged 5.4 months and was reported as mild to marked regression of primary or metastatic nodules in over half the patients. Two of five patients with manifestations of central nervous system metastases had marked improvement of symptoms. Likewise, fluid accumulation was controlled in two-thirds of the patients when Thiotepa was injected into the pleural cavity. For example, after one or more injections, no further taps were needed in 26 of 36 patients with pleural effusion. Hunter[23]

reported improvement from the use of this drug in lymphatic leukemia and lymphosarcoma. The effect was not apparent for 5 to 15 days; the maximum improvement was noted about the twenty-first day. It should be added that the high percentage of beneficial effects noted by Bateman has not been obtained by all other workers. For example, Olson[21] observed that it was most effective in lymphoma, cancer of the breast, and embryonal carcinoma of kidney, but that it had little or no effect on other tumors, including melanosarcoma and cancer of the lung, rectum, colon, ovary, larynx, bladder and thyroid.

MYLERAN® has been reported as being effective in chronic myelogenous leukemia and chronic lymphocytic leukemia. Sullivan[21] reported subjective tumor regression in 6 of 18 patients with bronchogenic carcinoma. One of the undesirable side effects following use of this drug is thrombopenia.

Triethylene melamine (TEM) has an effect similar to nitrogen mustard, insofar as it is often effective in the treatment of Hodgkin's disease and other lymphomas. It certainly is not very effective in most of the solid tumors, including carcinoma of the breast. However, benefit has been reported in far-advanced ovarian carcinoma.

Chlorambucil or CB 1348 has been introduced relatively recently and it appears to have similar effects in various diseases, including lymphomas and leukemias (Doan, Israel and Ultmann[21]). For example, Ultmann reported subjective improvement reaching an average of nine months in 21 of 32 patients with chronic lymphocytic leukemia. The effects of various drugs, including those previously mentioned, have been summarized by Sykes, Philips and Karnofsky.[24]

Prophylactic or adjuvant therapy with anticancer drugs—Numerous experiments carried out in our laboratory two to three years ago showed that when nitrogen mustard and Thiotepa were given to rats which had been inoculated with Walker 256 cells, the incidence of "takes" was sharply reduced.[25] As a result of these findings, we have been using nitrogen mustard as a prophylactic and adjuvant agent when operating on patients with carcinoma of the breast, colon, rectum and stomach. Theoretically, these drugs administered at the time of operation might kill the loose cells implanted in the wound and those dislodged into the veins. They might also inhibit the growth of microscopic nests of cells which often lie dormant for years before they grow into active metastases. The resistance of the body in such instances holds these cell emboli in check, and a little added help from anticancer drugs might aid the host in this battle. However, more time is necessary to determine just how beneficial this prophylactic administration of drugs will be. Anticancer agents given as adjuvant therapy at the time of operation are *more toxic* than when given at other times, largely because of the increased danger of infection induced by bone marrow depression.

Immunologic therapy—Since most tumors appear to produce antigens, the possibility of developing antibodies of one type or another for therapy appears to be reasonable; however, there have been no reports claiming an effective agent of that type in the treatment of cancer in humans. Nevertheless, there have been favorable reports from experiments in animals, such as protecting mice with a vaccine against leukemia. Accordingly, it appears justifiable to hope that this method of treatment may later be applicable to humans. Obviously, if effective agents of this type could be produced, they would probably replace or eliminate the various other mechanisms of therapy.

Hormones—We have known for decades that castration is occasionally beneficial in cancer of the prostate and ovary. The work of Huggins and Dao[26, 27] has advanced our knowledge tremendously in this field. They have shown that the administration of estrogen to patients with carcinoma of the prostate results in pituitary inhibition with testicular atrophy equivalent to castration. Huggins and Dao[28] likewise have demonstrated that bilateral adrenalectomy produces regression in certain tumors, particularly in carcinoma of the breast. This may relieve symptoms for several months, but there have been no cures by this procedure. Hypophysectomy also will produce regression of certain tumors, particularly carci-

nom of the breast. Adrenal steroids have a regressing effect on certain malignant conditions such as the leukemias, but this effect is not striking.

Viruses—This form of treatment has been introduced only recently; accordingly, very little data are available on this subject. However, experiments have been conducted with 10 or 12 viruses. The Russian encephalitis virus and the Egyptian 101 viruses seem to offer the most promise.

Summary

Cancer, one of the most serious diseases known to mankind, is the second most common cause of death in our population. The spread of cancer via the blood stream is the primary mechanism which actually causes death. Venous spread of the tumor, implantation of tumor cells at the time of surgery, and residual tumors are the major causes of recurrence following definitive cancer surgery. Surgery and radiation are the only methods of treatment which actually result in the cure of cancer. More powerful methods of radiation give promise of better results. Increasing the extent of surgery, improvement in the assay of operability, better anesthesia, and correction of physical decrements have resulted in more effective cancer surgery.

The use of drugs has been an important addition in the fight against malignant disease. While the drugs now available have resulted only in palliation and not in cure of this disease, much investigation is being directed toward the discovery and screening of new agents, with the hope of finding more effective ones. Hormones have been used successfully in the palliative treatment of metastatic disease of the breast and prostate. Adrenal steroids have been found useful in the treatment of leukemia and certain lymphosarcomas.

Further improvement in our surgical efforts against cancer will come as the result of precautionary measures directed against dissemination of the disease via the blood stream and against implantation at the time of surgery. We believe that ligation of the vascular stalks and the lumen of the intestine prior to operative manipulation of the tumor will improve results. We also believe that we should try giving anticancer agents during and immediately after surgery to help the patient destroy loose cancer cells left in the wound or dislodged as venous emboli. This therapy might also delay the growth of microscopic nests of cells which often lie dormant for years; it might even destroy them, with the aid of host resistance which has been effective in holding them in check during the quiescent period. For this reason we have been giving multiple courses of nitrogen mustard, extending the therapy postoperatively, in our prophylactic or adjuvant program. Irrigation of wounds after cancer operations appears logical, but much work remains to be done to find effective agents. In some of our preliminary experiments, isotonic saline does not appear to be an effective agent.

Any study or consideration of the treatment of cancer encounters the unfortunate fact that a remarkably large percentage of patients are inoperable by the time operation for the tumor is performed. Some tumors produce symptoms no longer than a week or two before they are inoperable. However, the majority of the patients have had symptoms from 6 to 12 months before operation. It is reasonable to state that operation shortly after onset of symptoms would have resulted in cure in the vast majority of this group. Accordingly, we must increase our efforts to *obliterate the delay* between onset of symptoms and operation; by so doing, we can improve the results remarkably with proper use of knowledge available at the present time. We must get the patient to the physician sooner, and the physician must carry out detailed examination (including x-ray) earlier, even though many of these examinations will show negative results.

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Postgraduate Clinical NOTES

91. URIC ACID IN GOUT

The evidence is essentially complete in support of the presumption that the increased concentration of uric acid in the blood and body fluids of patients with primary or secondary gout is caused by an over-production of urates. Gout, secondary to a blood dyscrasia, such as myelofibrosis, leukaemia or polycythaemia has for long been attributed to an increased metabolism of nucleic acids.

In a number of patients suffering from gout, an increased excretion of uric acid in the urine may be observed. The opinion is generally held that there is no impairment in destruction of uric acid to account for the metabolic defect. Isotope studies have revealed, however, that there may be a limited destruction of uric acid in gouty and normal individuals but this does not appear to be responsible for the increased volume in the metabolic pool of uric acid and the increased concentration of this substance in blood and body fluids in gouty patients. Nor is there evidence for a primary renal defect as a fundamental cause of the hyperuricaemia.

The mechanism of the acute attack of gouty arthritis remains to be defined. It is believed that uric acid must be deposited in or about the joint space prior to the initial acute articular episode. No significant changes in the physical properties of uric acid in the joint have been demonstrated at the time of acute articular symptoms. Laster et al. (1957) have observed that urinary excretion of 8-hydroxy-7-methylguanine rises during the acute attack. This observation may be the clue to the relationship between the abnormal purine metabolism and the acute attack.

John H. Talbott, Advances in medicine, *Practitioner*, October 1957, p. 351

Some Fundamentals in the Interpretation of Chest Roentgenograms

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ROENTGEN examination of the chest is one of the most frequently performed diagnostic procedures; its importance in the detection of disease within the thorax is too well known to warrant discussion. Because interpretation of chest roentgenograms can be difficult, it is essential to understand certain basic facts concerning roentgen anatomy and the physiology of the intrathoracic structures. The roentgen diagnostician also must be familiar with the physical principles involved in the production of satisfactory chest roentgenograms, because alteration in technical factors can lead to difficulties or even gross errors in interpretation.

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In recent years there has been a tendency to use high kilovoltages in producing diagnostic roentgenograms. High kilovoltage tends to flatten contrast in the roentgenogram. In other words, the variation between the dense blacks and the opaque whites which determines the contrast in a roentgenogram is altered so that variations in tissue density are manifested in shades of gray. With high kilovoltage it is possible to use sufficient penetration to obtain an image of a dense structure without overexposing a less dense part. In the chest this is particularly useful because of the extreme degrees of variation in tissue density. The mediastinum containing the heart and other soft tissue structures requires much less exposure than the adjacent lungs, which are filled with air and are quite translucent. The external soft tissues of the chest wall also interfere with good visualization of the peripheral zones of the lung fields.

The usual roentgen ray transformer used for diagnostic purposes has a maximum output of from 100 to 135 kv. Roentgenograms made with kilovoltages over 100 are less likely

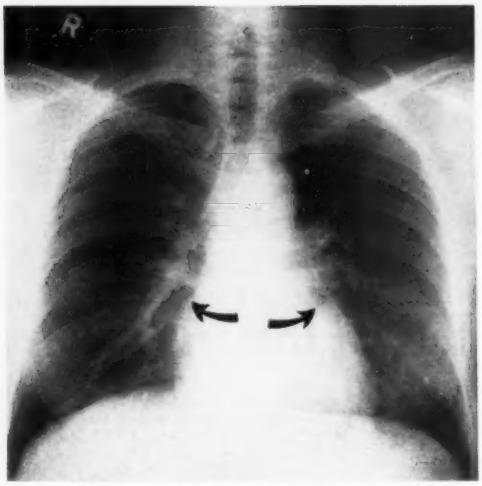

FIGURE 1. Posteroanterior roentgenogram of normal chest made with 110 kv. and using a thin wafer-type grid. The mediastinal structures can be visualized without overexposing the lung fields. Note that the entire trachea and the right and left bronchi are demonstrated. The bronchi to both lower lobes can be seen (arrows). The accompanying pulmonary arteries to the lower lobes lie immediately lateral to the bronchi and aid in outlining them. The artery to the right lower lobe is seen more clearly than the one to the left, the latter passing behind the heart.

to show variations in density; it is possible to obtain a satisfactory film showing all parts of the aerated lungs without overexposure of the central portions and with the peripheral zones well visualized, in spite of heavy breast or pectoral muscles overlying them. We have found that the over-all quality of such a roentgenogram also can be improved by the use of a wafer-type stationary grid (figure 1). The thin lines caused by the fine lead stripes forming the grid are visible but not objectionable, and they do not interfere with visualization.

In addition to the standard posteroanterior film, a lateral roentgenogram of the chest should be made in almost all cases. Experience has demonstrated repeatedly that a single projection of the chest is not always adequate to detect disease or to evaluate abnormal changes that may be seen. In a lateral view one can identify the anterior and posterior mediastinal areas to better advantage, as they form translucent zones above and in front of the heart and behind the cardiac margin. The posterior diaphragmatic sulci are demonstrated. The character of the hila of the lung is entirely different in this projection and, while both hila are superimposed, much information can still be obtained, particularly in the abnormal case. Many other aspects of the lateral roentgenogram also are valuable in routine roentgen practice.

There are a number of other methods of examining the chest, including oblique views, fluoroscopy, roentgen kymography and other more complicated procedures which are available in the study of particular conditions. Although I am limiting my discussion almost entirely to appearances and alterations as seen in the posteroanterior view, this certainly does not mean that other projections should not be utilized.

Pulmonary Blood Vessels

The importance of pulmonary blood vessels and pulmonary blood flow in the appearance of the lungs cannot be overemphasized. In the normal person, all of the blood returning to the heart from the systemic veins is circulated through the lungs, and at any given time the pulmonary arteries and veins are distended with blood and are surrounded by air-filled sacs (the alveoli), thus accounting for much of the density in the lung fields. A completely avascular lung can be compressed into a very small space and, while the pulmonary framework or interstitium does produce roentgenographic density, it is a rather small element in the picture. Therefore, variations in pulmonary blood flow and in the degree of distention of pulmonary vessels may alter the pattern of the lungs to a considerable extent.

When the cardiac chambers and pulmonary arteries have been opacified during the procedure of angiocardiography, the part of the cardiac silhouette occupied by the various chambers and by the pulmonary artery and its branches can be fully appreciated. Angiography in the normal person clearly demonstrates that the right cardiac margin, as seen in the frontal projection of the chest, is made up of the right atrium, while the right ventricle normally does not form either the right or left

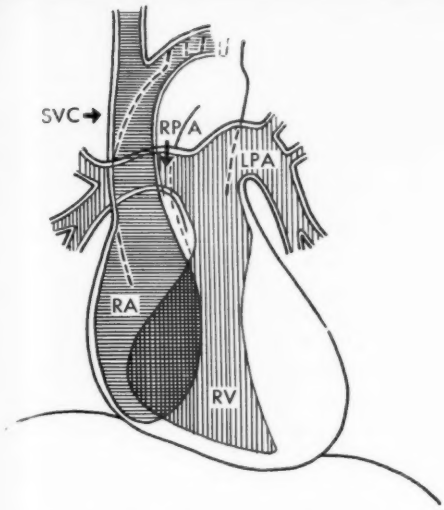

FIGURE 2. Diagram illustrating the anatomy of the superior vena cava, the right heart chambers and the pulmonary arteries as seen during angiocardiography. SVC, superior vena cava; RA, right atrium; RV, right ventricle; RPA, right pulmonary artery; LPA, left pulmonary artery.

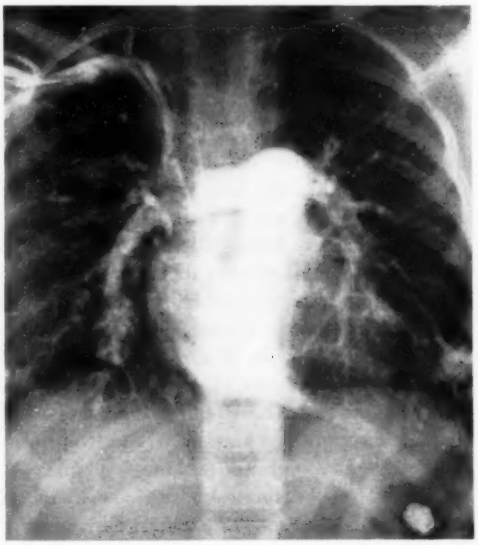

FIGURE 3. Angiocardiogram of a child with multiple congenital arteriovenous fistulas in the lungs. The main pulmonary arteries are dilated but otherwise normal. Note that the left pulmonary artery forms the upper part of the left hilum. The right crosses the mediastinum from left to right and cannot be visualized except during angiocardiography. Compare with the diagram in figure 2. The exposure illustrated was made after most of the contrast substance was in the right ventricle and pulmonary arterial tree, but some residue remains in the superior vena cava and right atrium.

border. It is an anterior chamber and is seen only by means of one of the oblique projections. The pulmonary artery extends upward toward the left from the region of the right ventricle, and the main pulmonary artery forms a segment of the upper left cardiac border directly below the aortic arch. The left pulmonary artery is clearly visible, as it forms the upper part of the left hilum or lung root shadow. On the other hand, the right pulmonary artery is not visualized unless it has been opacified, because it extends transversely to the right through the mediastinum from the point of bifurcation. When the right pulmonary artery reaches the right hilum or lung root, it almost immediately divides into branches for the upper lobe, with a large descending branch supplying the middle and lower lobes. (Figures 2 and 3.)

The anatomic difference in positions of the right and left pulmonary arteries is important, because it causes a distinct variation in

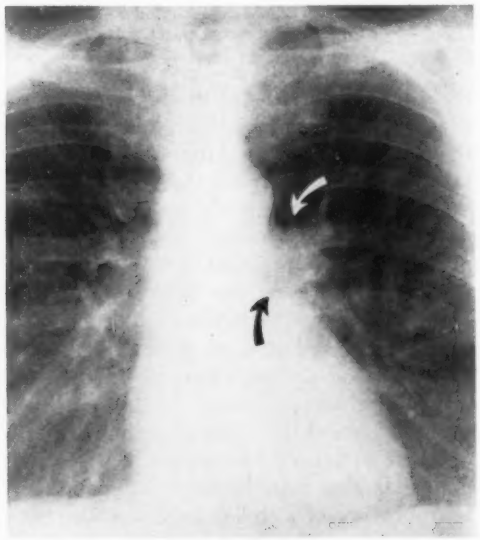

FIGURE 4. Appearance of lung hila in the presence of mild emphysema. The left pulmonary artery (upper arrow) forms a mass density in the upper left hilum with the left main bronchus just below it (lower arrow). There is no similar configuration on the right side, only smaller arterial branches being present in the upper part of the hilum. Care must be exercised not to interpret this finding as a tumor mass.

FIGURE 5. Pulmonary veins. Laminagram made to demonstrate the lymph node mass in the right hilum shows the pulmonary veins entering the left atrium, better shown on the right side (arrows).

the roentgen patterns of the hila. On the left side the upper part of the hilum, as seen in the roentgenogram, is formed by the rather homogeneous density of the left pulmonary artery, which lies directly above the shadow of the left main bronchus. The upper border of this density is almost invariably sharply defined from contiguous lung and often is slightly concave. The left main stem bronchus can be visualized in most normal persons, as it is bounded on the outside by its accompanying pulmonary artery. On the right, the upper portion of the hilum is composed of the network of arterial branches representing those extending into the upper lobe, and there is an absence of a well-defined vascular mass such as is noted on the left side. The lower part of the right hilum has a rather characteristic configuration. The descending branch of the pulmonary artery forms a well-defined density bounded medially by the main stem bronchus. While there are no two hila exactly alike, there is a normal pattern which can be identified in practically all cases. (Figure 4.)

Occasionally, probably because of emphysema, the larger pulmonary arteries in the hila stand out more prominently than usual. Sometimes, this is more obvious on the left side, and the main left pulmonary branch may be sufficiently prominent to suggest an abnormal mass in the left upper hilum. Helpful signs indicative of the vascular nature of the density include the location directly above the left main bronchus and the flat or slightly concave superior border rather than a convex one which would be expected with a tumor mass. Also, other arterial branches in the hila will stand out more prominently than usual, and the evidence of pulmonary emphysema may be quite definite.

The anatomic differences in the hila have been stressed, because the recognition of abnormalities, particularly lymph node enlargements, depends on the ability to recognize the normal structure and its variations. Admittedly, the line between the normal and abnormal condition in the appearance of the hila is no more distinct than it is for other anatomic structures depicted in roentgenograms.

The pulmonary veins form much less distinct shadows than do the arteries in roentgenograms, although the veins can be made out particularly as they approach the left atrium. The distribution of the pulmonary arteries corresponds to that of the bronchi, and there is a pulmonary arterial branch following each bronchus as it divides. This is not true of the veins; they have a course entirely independent of the bronchi. Only the larger pulmonary veins can be identified as such, and they are brought out particularly well in body-section roentgenograms or laminagrams (figure 5). The veins usually are visualized as they extend horizontally toward the region of the left atrium. They can be seen to cross the pulmonary arteries in this particular part of the lung. Thus, in roentgenograms, it sometimes is possible to identify the veins as separate from the arteries.

Not infrequently, directly above the hila on either side, an end-on visualization of a branch bronchus and its accompanying pulmonary artery is demonstrated. When visual-

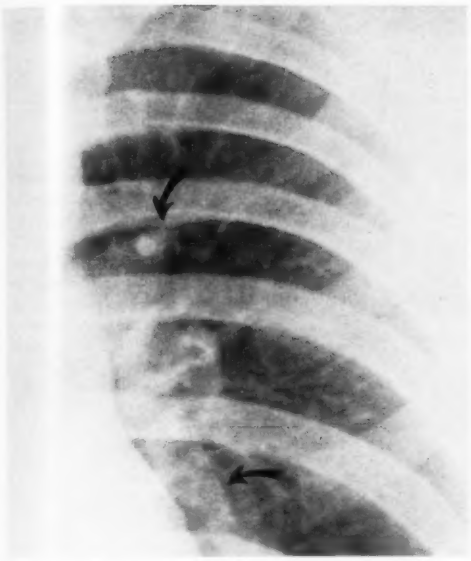

FIGURE 6. Cross section of blood vessel and bronchus (upper arrow). The vessel, a branch of the left pulmonary artery, is seen end on as a round, dense "spot." The accompanying bronchus is approximately the same caliber, but is seen as a thin-walled ring. The relative shadow-producing qualities of a blood vessel and a normal bronchus can be appreciated when they are seen in this way. The pulmonary artery to the left lower lobe is clearly visualized (lower arrow).

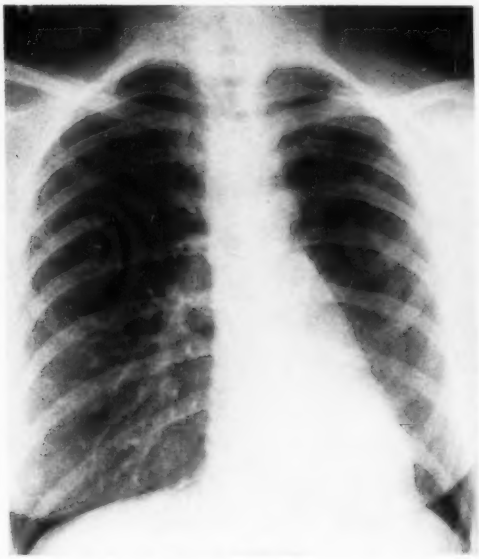

FIGURE 7. Agenesis of the left pulmonary artery. The left hilum shadow is absent. There is a notch in the upper left cardiac silhouette where the left pulmonary artery should be. The left lung is more translucent than the right, an indication of its relative avascularity. The fine linear strands in it represent dilated bronchial arteries which supply what blood is reaching this lung.

ized in this manner, the bronchus is seen as a thin-walled ring with a translucent center because of air content. The pulmonary artery is of the same caliber but is homogeneous and dense, because it is filled with blood. This configuration indicates clearly the relative shadow-producing qualities of a bronchus and a blood vessel. The normal bronchus when seen in any direction but directly end on is not very likely to cast much of a density in the roentgenogram; however, the pulmonary artery will be visible. The pulmonary arterial branches form the major part of the network of radiating lines (the so-called bronchovascular or pulmonary markings) that make up the pattern of the lung fields. It is evident, therefore, that the lung roots or hila and the linear markings in the lung fields seen roentgenologically are caused largely by pulmonary vessels, and that the pulmonary arteries are more

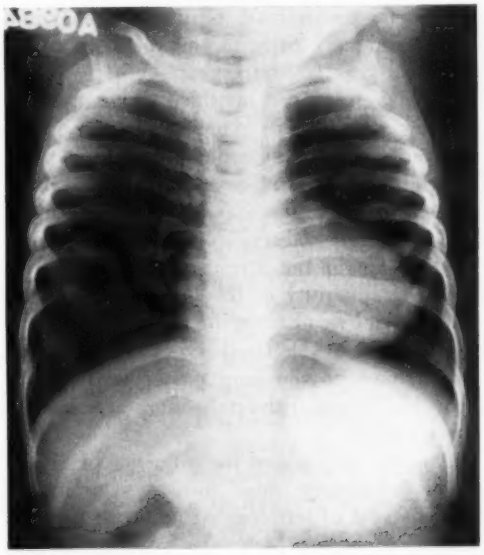

FIGURE 8. Tetralogy of Fallot. Because of the pulmonary stenosis which is part of this syndrome, there is diminished blood flow through the lungs. The hila are diminutive and the lungs hypovascular.

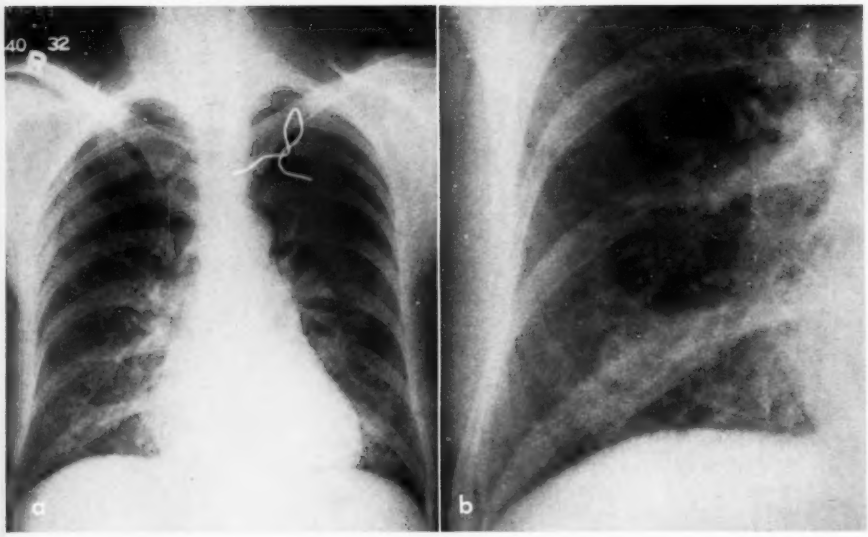

FIGURE 9. Pulmonary congestion due to left ventricular failure in a patient with hypertensive cardiovascular disease. a. The engorged vessels cause an intensification of the normal "pulmonary markings." b. Enlarged view of right lower lung field shows the hazy network of engorged vessels to better advantage.

conspicuous in producing these densities than are the veins. (Figure 6.)

Normal mediastinal lymph nodes are small structures, and it is impossible to visualize them as individual densities in the lung roots unless they become appreciably enlarged. Actually, in the normal structure the lymph nodes add very little to the roentgen hilum shadow. This is well exemplified in certain abnormal conditions in which congenital pulmonary stenosis or pulmonary atresia causes a severe or complete reduction in pulmonary arterial blood flow. For example, congenital aplasia of one pulmonary artery results in an almost complete absence of the hilum shadow on the side of the atresic vessel and an increased radiability of the lung field, with almost complete absence of pulmonary markings. (Figure 7.) In this defect the blood which flows to the lung passes through the bronchial arteries; the pulmonary arterial tree carries none.

Another example of the influence of diminished pulmonary blood flow is seen in the average case of tetralogy of Fallot. If the pulmonary stenosis which is a part of this syndrome is at all severe, the decrease in pulmonary blood flow is reflected in diminutive hilum shadows and a scanty vascular pattern in the lung parenchyma. When the increased radiability of the lungs is of any appreciable degree, the roentgen appearance of the hypovascularity is quite striking. (Figure 8.)

The opposite extreme of this is seen in those congenital defects in which the shunt is predominantly from the left to the right side of the heart so that an increased amount of blood flows through the pulmonary vascular system. This may be caused by a defect in the atrial or the ventricular septum, or it may result from a patent ductus arteriosus. As long as the pressure on the left side is higher than that on the right, the tendency will be for the blood to be shunted from the left cardiac chambers to the right side. The pulmonary arteries and veins, therefore, must carry an appreciable increase in volume of blood; this is reflected in dilatation of the vessels. The pulmonary arterial branches in the hila become enlarged and the vascular pattern in the lung fields is intensified. When at all severe, the appearance of increased blood flow is practically diagnostic of a left to right shunt, although it may not be possible to determine the level of the shunt.

In general, therefore, when the pulmonary markings in the lung fields appear to be abnormally increased in prominence, one should

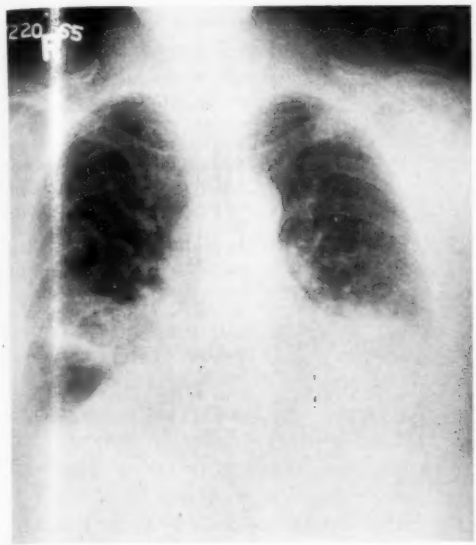

FIGURE 10. The chest in severe cardiac failure (hypertensive disease). Pleural fluid clouds the lower parts of the lung fields. Superiorly, the evidence of congestion is apparent.

think first of the possibility of a vascular cause for such enlarged markings. Because pulmonary arteries and bronchi are immediately adjacent to one another, inflammatory changes in the bronchi leading to thickening of their walls and infiltration in the contiguous peribronchial tissues may sometimes be sufficient to cause a general intensification of the lung markings. In silicosis, for example, intensification of pulmonary markings is one of the early signs of reaction to the deposition of silica dust. In order to evaluate the changes properly, it is necessary that one correlate the appearance of these markings with other findings, particularly with the size and contour of the heart and with known clinical facts concerning the patient.

Pulmonary Congestion and Edema

Dilatation of pulmonary arteries and, to a lesser degree, of the veins secondary to increased pulmonary blood flow because of a congenital shunt is sometimes described as congestion, but it must be distinguished from congestion secondary to cardiac failure (figure 9). In the latter condition the pulmonary vessels also are dilated, but there is a slowing of the pulmonary circulation. The total amount of blood passing through the pulmonary vascular system during any given period of time is diminished in contrast to the increased blood flow secondary to a congenital shunt, as described previously. In congestive heart-failure pulmonary veins tend to increase in prominence. Sometimes this is more noticeable than the enlargement of pulmonary arteries. As noted before, the position of the larger pulmonary veins is different from that of the arteries and helps to identify them. When distended, the margins of pulmonary veins are not as sharp as those of dilated pulmonary arteries. In addition, there is often evidence of edema in the lungs and fluid in the pleural cavities (figure 10). If the amount of pleural effusion secondary to the cardiac failure is large it is usually recognized without difficulty. Small amounts of fluid are more difficult to demonstrate, but blunting of a costophrenic sulcus and increased prominence of interlobar septal lines are significant findings. In congestive failure, thickening of the interlobar septa may be an important clue in determining the presence of congestion in the lung fields, and this increased prominence of interlobar fissures is caused by a small layer of fluid (figure 11). As compensation is reestablished these lines tend to disappear.

The Lungs in Mitral Valve Disease

In some patients in the early stages of congestive failure, in addition to increased prominence of the pulmonary vascular trunks and haziness of the outlines, fine transverse striations can be demonstrated along the peripheral zones of the lower lobes on one or both sides; however, they are more often seen on the right (figure 12). The nature of these lines has been in dispute for some time, and various observers have considered them to be due to dilated pulmonary lymphatics, by accumulations of edema fluid in the interlobular septa, or as a result of deposition of hemosiderin in and along the interlobular septal planes. The current consensus is that these lines are indicative of dilated pulmonary lymphatics and

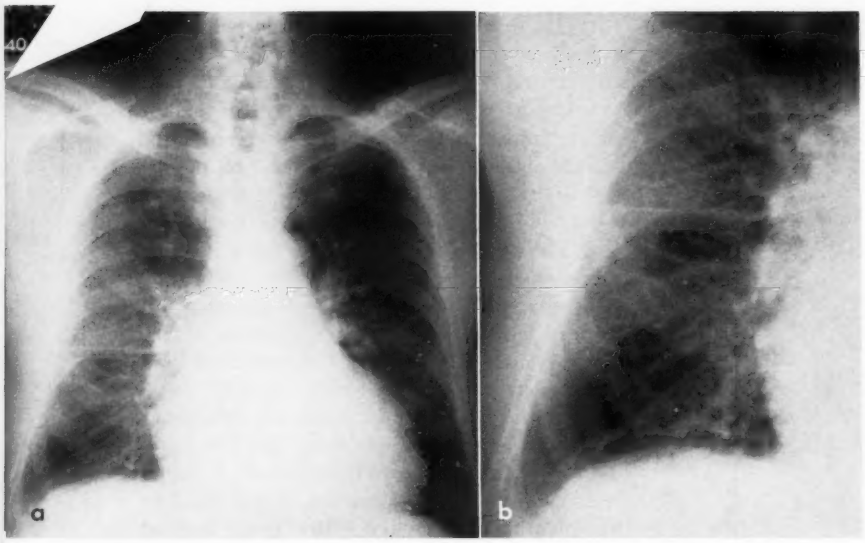

FIGURE 11. Congestion and edema secondary to cardiac failure in a hypertensive patient. a. Posteroanterior roentgenogram of the chest. b. Enlarged view of right lower lung. The vessels are engorged and their outlines are hazy. The hilum vessels are large. A small amount of fluid clouds the costophrenic sulcus and thickens the shadow of the interlobar fissure between the upper and middle lobes. This is the characteristic pattern of congestive failure.

that they occur because of pulmonary venous hypertension. They are found most frequently in association with mitral valve disease but they do occur at times during the early stages of left ventricular heart-failure. In the latter condition, as compensation is established the lines disappear. In mitral valve disease the lines frequently persist for long periods of time and may not disappear even after a mitral valvotomy has been performed. In some cases it seems likely that fibrous thickening of the interlobular septa may have developed secondary to the long-standing lymphatic dilatation and venous hypertension, thus accounting for the persistence of the shadows. A similar type of linear striation is found in conditions other than cardiac failure, including pneumoconiosis and other causes of pulmonary fibrosis. In general, however, the presence of these lines, often called Kerley's lines, can be considered as presumptive evidence of the existence of pulmonary venous hypertension or the previous existence of this condition with secondary interlobular fibrosis. In most cases mitral stenosis is responsible for the lines.

Patients with mitral valvular stenosis frequently show such an engorgement of the pul-

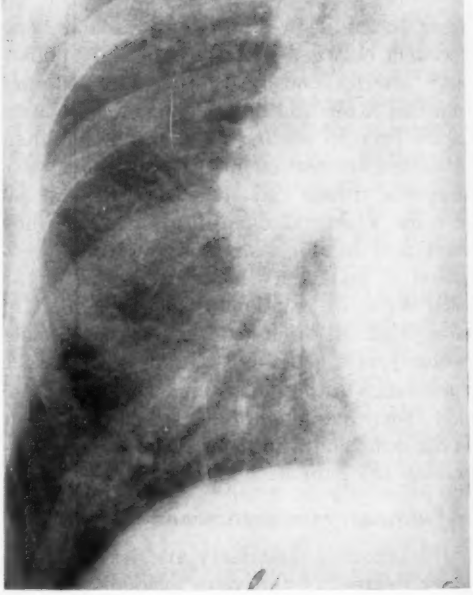

FIGURE 12. Right lower lung in a patient with pulmonary hypertension secondary to severe and long-standing mitral stenosis. Note the transverse linear striae at the outer margin of the lung. These probably represent dilated lymphatics.

monary vessels in the hila and adjacent lung fields that a diagnosis of lymph node enlargement may be entertained as a cause for the hilar increase (figure 13). The cardiac silhouette is usually typical enough that the diagnosis can be made without much difficulty. The dilatation of the pulmonary outflow tract produces a convexity of the left midborder and the pulmonary arch. The enlarged left atrium can be identified projecting posteriorly when the patient is examined in different projections, particularly with barium in the esophagus. It is not uncommon to find large vascular trunks extending into the hila which appear to be dilated pulmonary veins; sometimes these are more marked in the upper lobes than they are inferiorly in the presence of mitral stenosis.

When acute failure supervenes in a patient with mitral valve disease, a hazy increase in density develops in the lung fields which may be fairly uniform or more patchy in distribution. Some of this increase in density is the result of congestion and some indicates the presence of pulmonary edema. Because many patients with chronic mitral valve disease also have a certain amount of hemosiderosis, this must be taken into account in interpreting lung field changes. Deposits of hemosiderin tend to cause a fine, almost miliarylike, granular mottling of the lung fields.

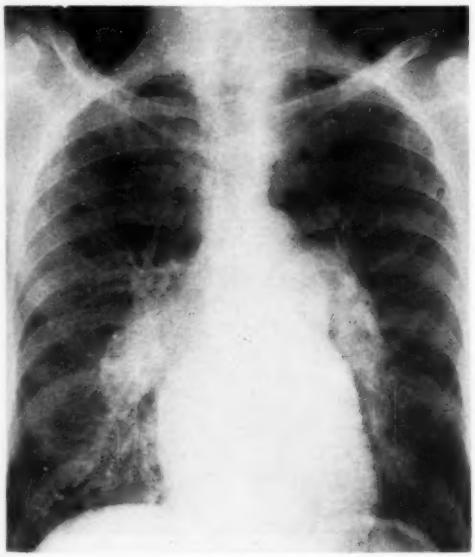

FIGURE 13. Dilated pulmonary arteries in the hila in a patient with mitral stenosis (same case as figure 12). Severe pulmonary hypertension is responsible for the enlargement of these larger pulmonary arterial branches which mimic the appearance of enlarged hilum lymph nodes.

Conditions other than those mentioned, such as polycythemia vera, may also cause increased prominence of pulmonary vascular trunks. In some patients with polycythemia vera, the engorgement of pulmonary vessels is quite striking. A similar appearance is sometimes encountered in myelogenous leukemia.

Bronchial Obstruction and Pulmonary Collapse

One of the frequent roentgen observations in the presence of intrathoracic disease is evidence of bronchial obstruction. Obstruction of either a large bronchus or multiple small bronchi is a frequent complication of many diseases, and recognizing the changes which may occur becomes very important.

Bronchi dilate during inspiration and decrease in caliber during expiration. There are several mechanisms that may develop when a bronchus becomes occluded or partially occluded. This is true regardless of whether the obstruction is caused by an endobronchial lesion, such as a foreign body or a tumor, or by compression from without. For example, a small lesion, such as a tumor nodule or a small foreign body, may not be large enough to obstruct completely the bronchus in which it is lodged during the inspiratory phase, and air can pass through the bronchus into the lung. During expiration, however, the decrease in caliber of the bronchus may be sufficient to obstruct it completely so that the air is trapped distal to the obstruction. When this happens the lung beyond the foreign body or the tumor undergoes an obstructive emphysema and becomes overinflated. It does not collapse during the expiratory phase, and in roentgenograms it remains hyperaerated or translucent. If the foreign body or tumor nodule is larger, it may obstruct the bronchus completely in all phases of respiration. When this happens air is absorbed distal to the block

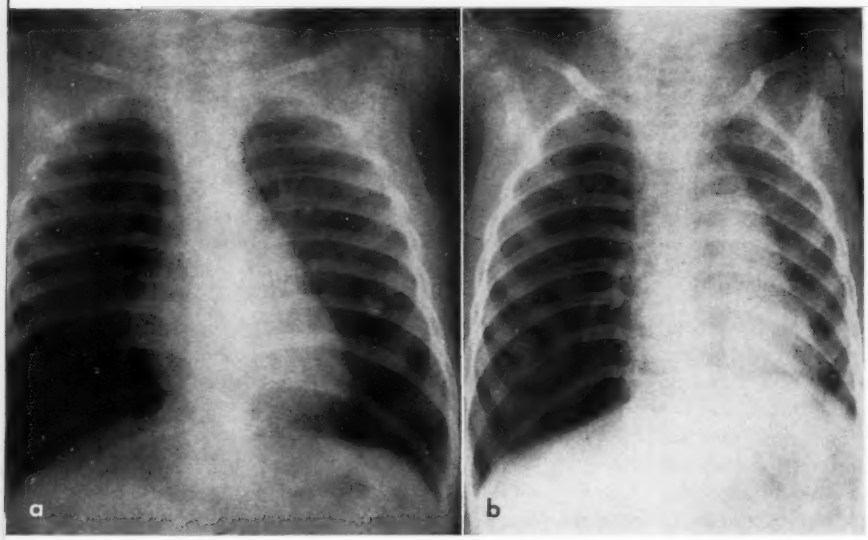

FIGURE 14. Check valve obstruction of the right main bronchus caused by a foreign body (small piece of the core of a pear). a. Roentgenogram at the end of deep inspiration. b. Same patient at the end of expiration. The air entering the right lung during inspiration is trapped by this valvelike mechanism, and the lung remains distended. The left lung deflates normally. The difference in pressures causes the mediastinum to shift to the uninvolved side.

and the lung becomes airless and collapsed. Thus, depending on whether a check valve mechanism exists in the bronchus or whether complete obstruction is present, there will be considerable difference in the appearance of the lung distal to the obstruction. In the first instance the lung remains overinflated, even during the expiratory phase, while in the latter it becomes completely airless and collapsed and, therefore, radiopaque. (Figures 14 and 15.)

There is a third mechanism which is encountered in some conditions, particularly in infiltrative tumors involving the circumference of the bronchial wall but not completely obstructing the lumen. Because of infiltration, the caliber of the bronchus does not change during inspiration and expiration; thus, air that passes through the lesion into the lung during inspiration can be forced out during expiration. The lesion, therefore, leads to neither obstructive emphysema nor complete collapse of the lung. Usually the lung or lobe involved is diminished in volume and does not have the normal degree of radiolucency. Sometimes the change is minimal and difficult to visualize, so that the classic signs of an obstruction of the bronchus may be difficult to elicit. This mechanism should be borne in

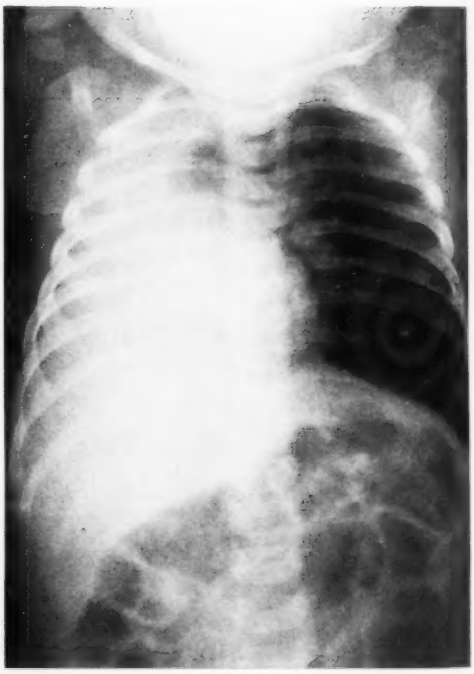

FIGURE 15. Foreign body in the right main bronchus, which has occluded the lumen completely. The lung has become completely airless and radiopaque. The mediastinum has shifted into the right thorax as the volume of the lung has decreased. The right heart border cannot be identified because the density of the heart and lung has become identical.

mind when one is evaluating the changes that may be present secondary to a bronchogenic tumor.

Atelectasis or collapse of pulmonary tissue is another frequently encountered sign of disease. As previously mentioned, it may be caused by a complete obstruction of one or more bronchi. If a main bronchus or one of the lobar bronchi is occluded, the signs of atelectasis are usually quite definite. The lung becomes airless, opaque and decreased in volume. The signs of decrease in pulmonary volume are (1) displacement of interlobar fissures, (2) retraction of mediastinal structures toward the side of involvement, (3) elevation of the hemidiaphragm, and (4) narrowing of rib interspaces. Not all of these signs need be present in an individual case, and unless the bronchial obstruction affects one of the larger bronchi it is unusual to find significant displacement of the structures other than the interlobar fissure. Atelectasis of the lung also can result from obstruction of multiple small bronchi rather than of any of the larger lobar branches. In many chronic inflammatory diseases obstruction of small bronchi and bronchioles leads to the roentgen appearance of pulmonary collapse, with shrinkage in volume and general opacity of the affected lung. However, the major bronchus to the lobe may be entirely patent.

Atelectasis also can be caused by compression of the lung, such as may occur with elevation of the diaphragm and restriction of its motion. This is seen in association with abdominal distention from any cause. In these patients the major bronchi are completely patent, but the lung is compressed and the thoracic cavity is reduced in size because of the diaphragmatic elevation. Compression atelectasis frequently is manifested in roentgenograms by the presence of linear bands of increased density crossing the lung fields inferiorly or by the presence of flat or wedge-shaped areas of density.

Comment

In this discussion of only a few of the many aspects of chest roentgenography I have emphasized the importance of considering the cardiovascular system and the lungs together in the interpretation of roentgenograms. One may influence the other greatly, and they must be considered as a whole. I have also pointed out some of the ways in which bronchial obstruction can occur and the mechanisms concerned in the development of obstructive emphysema and of pulmonary collapse.

Pelvic Pain

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PELVIC pain in women is a practical subject but at the same time a confusing, all-encompassing one. Women have great difficulty in localizing pelvic pain. Many women who complain of pain in the lower portion of the abdomen and pelvis do not have gynecologic disease; their attention is focused on the uterus and adnexa but they are wrong 40 per cent of the time. It is important, then, to consider extragenital sources of pain.

Why is it so difficult to evaluate and localize pelvic pain? Apparently, one of the main reasons is that the brain is not very quick about picking up and localizing pain arising from the deep pelvic viscera. The brain has not had much experience in this regard and does not seem to acquire it, probably because there are no concentrations of sensory nerve ganglia in the pelvis as there are in the cornea, skin or periosteum, permitting a sharp differentiation or evaluation of pain. Experimentally, the injection of irritating solutions into periosteum, ligament, joint, tendon, fascia or skeletal muscle will produce painful sensations of greatly varying severity, depending on the concentration of pain receptors. For example, finely beaded nerve terminals are densely packed in periosteum but widely separated in muscle. The accuracy of the pain localization will depend on the density of the innervation to the area. The intensity of the stimulus is important in localization.

Another interesting factor involves the rate of conduction of painful stimuli. There are, of course, two types of pain. When you stub your toe you immediately experience a sharp, vivid flash of pain at the point of contact. Your instinct is to pull the foot away or run off and hide until the pain subsides. After a few seconds a sickening, aching pain is felt. The sensation is disagreeable, diffuse and hard to localize. Nausea, syncope, fall in blood pressure

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and prostration are noted but the patient cannot localize her pain. She simply wants to curl up until it passes off. The majority of impulses from a deep structure such as muscle, ligament or joint as well as from viscera produce this type of disagreeable, probing ache which is difficult to describe and hard to localize. The difference between the immediate pain which can be pinpointed and the diffuse, unpleasant sensation which cannot is probably due to a combination of the intensity of the stimulus and the rate of its conduction.

Visceral pain is hard to localize. Nerve endings extend to all the internal organs but they are few in number. Production of pain requires a summation of stimuli over a wide area. A segment of bowel can be crushed with a clamp without producing pain. When a loop of bowel becomes distended, however, pain can definitely be felt. There is only a qualitative difference between visceral and somatic pain; in all probability this depends on the density of innervation.

Response to pain varies widely in different individuals and in different situations. For example, wartime and athletic injuries occur under emotional stress and excitement and often seem less painful. Our state of mind has much to do with our response to pain. We disregard daily aches and pains when we are active and happy. Anxiety and fear, however, may reverse the normal response. A previously healthy person who suddenly becomes ill is frightened and may have more pain from the same disorder or injury than the chronic sufferer who has learned to live with it. While pain very likely has a neurotic component, I believe there is always a basis for it. Exaggeration and introspection provide the neurotic superstructure. Some persons appear to be born without a sense of pain while others are abnormally sensitive. The individual variation in response to painful stimuli comes when they reach the brain rather than at the local skin threshold.

General physical condition, fatigue and anemia all play a role in lowering the pain threshold. Acute inflammation definitely diminishes this threshold. Skeletal muscle, for example, is normally insensitive, for there are few pain receptors present. You can incise it or put needles through normal muscle without producing pain. Once it is infected, however, even the injection of NOVOCAIN® produces pain. The appendix under normal conditions is insensitive but pressure on it in the presence of inflammation produces pain.

There is no real fundamental difference between pain of visceral origin and that from deep somatic structures. One cannot localize pain arising from pelvic viscera clinically by its characteristics or its zone of reference. Pains of somatic and visceral origin have the same quality and segmental distribution. Somatic pain usually results from irritation of the roots, ganglia or trunks of the spinal nerves. The point of origin is either in or close to the vertebrae. It may be caused by any disease process, toxic absorption or mechanical disturbance that irritates the spinal nerves. This produces a segmental neuralgia. The main characteristic is tenderness of the parietes. Pressure against any bony structure or against contracted muscle or palpation of the abdominal wall reveals deep tenderness. Tenderness is also apparent along the paravertebral region or along the rib border corresponding to the distribution of the nerves to the anterior abdominal wall. This never occurs in visceral disease. There is localized tenderness in visceral disease but it does not have wide segmental distribution.

What Stimuli Produce Painful Sensations From Pelvic Disease?

Stimuli which are adequate to produce painful sensations from pathologic processes in the pelvis are generated by (1) sudden distention, (2) vigorous contraction of hollow viscera, (3) rapid distortion of the capsule of a solid organ, (4) crushing or stretching of blood vessels, (5) anorexia of functioning muscle tissue, and (6) impingement of nerves by fibrosis or inflammation.

Though there is no well-established method of localization of pain according to the point of skin reference, we are in the habit of allocating pain from underlying pelvic viscera to certain areas. For example, we believe that pathologic processes involving the cervix, low-

er uterine segment, urethra and trigone of the bladder as well as the rectum tend to produce pain which will localize in the lower sacral area or buttock and radiate down the leg. Painful stimuli from the fundus of the uterus and bladder as well as the inner end of the tube roughly localize in the lower abdomen from umbilicus to groin.

Unfortunately, disease in and around the spine may provide the same localization and radiation. It is important, therefore, to question the patient about the nature of the pain and its distribution. The actual distribution and the manner in which it spreads may be important points in differentiating between pain arising in the back and that from pelvic organs. We loosely use the terms "radiated" and "referred" without thinking too much about what they really mean.

Though we are often inaccurate in our attempts to localize pelvic pain, we do recognize that there is a difference between pain of ovarian origin and that arising from the uterus. This is not surprising since the sensory nerve fibers from the ovary come off the cord at the tenth, eleventh and twelfth thoracic segments, higher than those associated with uterine pain.

What Do We Know of Ovarian Pain?

In the ovary, as in all structures covered with visceral peritoneum, pain results from stretching and distention of smooth fibers or from circulatory disturbances. For example, the steady "dull stone ache" of the ovary in the Stein-Leventhal syndrome is due to the pressure exerted by multiple expanding follicles within the ovary that cannot break through the restraining capsule. The twisted ovarian cyst produces severe pain because there is a sudden distention as the pedicle twists, producing hemorrhage within the cyst. Unless these factors are present the ovary does not produce pain. This is why carcinoma of the ovary has such an insidious onset.

Mittelschmerz or rupture of the ovarian follicle produces pain in a different manner. The parietal peritoneum and the underlying pelvic connective tissue are very sensitive to any irritation or trauma. As is the case in ectopic pregnancy or rupture of an endometrial implant, the pain is produced by intraperitoneal hemorrhage. Except for distention of the outer end of the tube, which has the same innervation as the ovary, there is little to distinguish ectopic pregnancy before rupture has occurred. The symptoms from all these entities are due to intraperitoneal hemorrhage and peritoneal irritation. This mechanism has been called the peritoneocutaneous reflex. The pain from acute appendicitis follows the same pattern. At first the patient complains of colicky, mid-abdominal pain with nausea and vomiting as the appendiceal wall stretches and distends. The impulses are carried over the splanchnic nerves. As the inflammation spreads over the appendix to the more sensitive parietal peritoneum, the pain localizes in the right lower quadrant, carried there by the intercostal nerves. The greater the contact of disease process with the peritoneum, the more pain results. One may have extensive visceral disease but unless the viscera are distended or the inflammatory process comes in contact with the peritoneum, there may be little pain.

The deep pelvic connective tissue is even more sensitive to irritation than the parietal peritoneum. Lymphatic invasion in the parametrial area from chronic cervicitis, septic abortion or pelvic streptococcal infection produces a deep pelvic "toothache" because of involvement of the nerve fibers in the base of the broad ligament. Any condition that produces pelvic congestion brings the same sort of discomfort. Add to this tubal distention and irritation of the adjacent pelvic peritoneum and you have an explanation for the varied manifestations of pain in pelvic inflammation. One may explain the acute phase on the basis of tubal distention plus the irritation of the parietal peritoneum. Infiltration of the lymphatics in the deep pelvic connective tissue plus the contact of the disease process with the parietal peritoneum may account for the more chronic pain.

What Do We Know of Uterine Pain?

The intensity of the stimulus will influence the severity and distribution of pain from the uterus. Stimulation of the uterine cervix by an

electric current will produce pain over the suprapubic area. Injection of saline will relieve the pain if mild stimulation is used, but Novocain will not relieve it when the stimulus is increased. The same is true in a patient with ureteral obstruction and pain in the groin. Likewise the pain from presence of a balloon in the jejunum can be relieved temporarily by injecting Novocain at the point of skin reference, but if you increase the stimulus the pain always breaks through and spreads to the periphery of the injected area.

There is another factor which may have a bearing on uterine pain. The uterus is constantly subject to trauma. Irritation of peripheral end-organs tends to lower the sensory threshold. Repeated infection or trauma may either lower the threshold at the local level or establish a pattern in the higher centers.

Uterine pain commonly manifests itself in one of two ways. *Uterine colic* is the more common. Powerful contractions of the uterine muscle occur as it attempts to rid itself of a foreign body such as a polyp, submucous fibroid or placental remnant. The more stenosed the cervix, the more severe the cramps, for the pain center of the uterus is localized at the cervix. It is here that the fibers of the sympathetic and parasympathetic coalesce to form Frankenhäuser's ganglion. The rest of the uterus is not well supplied with nerve endings.

In addition to the colicky cramplike pain, patients with uterine pathology also complain of a *bearing-down pain* with radiation down the leg. This may be due to irritation of the nerve endings through permeation of the regional lymphatics from an entity such as chronic cervicitis or it may be due to pulling on these same nerves from either prolapse or procidentia.

A retroverted uterus, if fixed in the pelvis by other pathology, or congestion of the blood supply can produce this bearing-down sensation. In general, however, one should avoid explaining backache on the basis of retroversion or pelvic congestion. Too frequently the backache is due to faulty posture, particularly in women over 40 years of age. In the past, suspension operations were performed to relieve back pain believed due to retroversion. Today there is little place in gynecologic surgery for the suspension operation as the sole definitive procedure. It does have a place when combined with other pelvic operations.

Do Pelvic Tumors or Pelvic Malignancies Cause Pain?

A patient may harbor malignant disease in the pelvis without ever having any pain. The appearance of pain indicates that (1) an accident has occurred within the tumor, (2) it has invaded other structures, or (3) the disease has spread to invade the deep pelvic connective tissue or the peritoneal surface. This is true of bladder and rectum as well as ovary, endometrium and cervix. The same is true in cases of benign tumors within the uterus. Fibroids, for example, rarely produce pain. If the tumor is pedunculate and subject to torsion of the pedicle, the blood supply may be cut off. The tumor may outgrow its blood supply and degenerate. In such instances the patient may have exquisite pain. A submucous fibroid may produce colicky pain as the uterus tries to extrude it, but as a rule, fibroids and large pelvic tumors do not cause pain. They may cause discomfort through the pressure of increasing size or particular location, but pain is usually a sign of extension of the tumor beyond the site of origin.

It is beyond the scope of this paper to discuss the various pathologic entities which may produce pelvic pain. Certainly all the sources are not gynecologic. The female pelvis has been called the melting pot of the surgical specialties. Among the general surgical conditions one must list appendicitis, diverticulitis, ulcerative colitis, volvulus and retroperitoneal tumors. The mechanism of pain production follows the general pattern. Disease of any organ in the urinary tract may be responsible for pelvic pain. Finally, pain from somatic sources, common to the orthopedic surgeon, must be ruled out before attributing pain to the uterus and adnexa.

Urologic Considerations

Perhaps the commonest source of obscure pelvic pain is the urethra. Lesions located here

are likely to escape detection. Lesions of the vesical neck tend to produce pain which is localized to the perineum along the course of the urethra or deep in the bony pelvis. This distribution is common to trigonitis, vesical calculus, stone in the lower ureter, stenosis of the vesical neck, or neoplasm involving the neck of the bladder. If one suspects disease of the urinary tract, the patient should not only have a cystoscopic examination but this examination should include an inspection of the urethra. Frequently this is not done. The urethra should be calibrated to rule out any stricture which may tend to produce retention of urine within the bladder. This may be the source of obscure pelvic pain even when other cystoscopic findings are normal and infection is absent.

Many patients without obvious urologic disease obtain complete relief of obscure pelvic pain by urethral and vesical neck dilatation combined with bladder irrigations. Recently it has been found that estrin is of great value in the postmenopausal patient with bladder symptoms. Investigators have noted that the urethral mucous membrane atrophies and is easily infected when the ovary fails to produce adequate amounts of estrin. Supplying estrin orally reactivates the urethral epithelium and the infection disappears. Urethral caruncles also vanish.

The urologic lesion which most typically produces pelvic pain is cystitis. Suprapubic pain is elicited when the inflamed bladder becomes distended with urine. Perineal pain occurs during micturition and closure of the vesical neck. In acute cystitis the pains are severe and constant. In chronic infection pain may be mild or absent. The same kind of pain on filling of the bladder is also typical of submucous fibrosis which sharply decreases the bladder capacity. One should suspect its presence when a catheterized urine specimen fails to reveal infection. The diagnosis is confirmed by cystoscopy.

Although located at a distance from the pelvis, the kidney may refer pain to the lower abdomen. Usually this pain is dull and indefinite, tending to localize on one side or the other. It often extends upward along the course of the ureter to the lumbar region. Ptosis of the kidney, hydronephrosis, renal infection and calculi all produce pelvic pain.

Somatic Sources

Gastrointestinal, gynecologic and urologic lesions are not the only sources of pelvic pain. The importance of ruling out somatic sources must be stressed. The patient always believes the pain is of visceral origin, and, uncertain as to its source, she consults with the doctor. Pain of somatic origin is far more common and one must rule it out before undertaking abdominal exploration for symptoms that vaguely suggest a genital source. Poor posture, spinal disease or inflammatory processes irritating the nerves in the area adjacent to the spine may produce pain with abdominal reference. Careful attention to the patient's history as to the onset, character and distribution of pain will often yield helpful information. The gynecologist should learn to examine the back and then examine the pelvis before attributing pelvic pain to genital disease. Likewise the orthopedic surgeon should do a pelvic examination before he treats the back. I recently saw an elaborate orthopedic work-up for pelvic backache in a patient with an unrecognized cancer of the cervix.

In many instances it is hard to know which area is the basic source of pain. This is particularly true when palpable evidence of disease is not outstanding. Burch has reported a simple maneuver which helps in distinguishing pain of skeletal origin from that due to pelvic causes. When the examining hand is placed on the abdominal wall the patient complains of pain. The intravaginal finger is then introduced anterior to the cervix and gentle pressure is applied by both the abdominal hand and the vaginal finger. The pressure on the abdominal wall is gradually released. If the pain diminishes and the uterus, adnexa and bladder are felt without pain, then a somatic origin is suspected. Too frequently in examining a patient the normal uterus is pressed against a tender abdominal wall.

In the presence of a reasonable explanation of pain in both back and pelvis, either the orthopedic surgeon or the gynecologist must

take charge. The patient cannot serve two masters. For example, a patient with a disrupted intervertebral disk may also have a fibroid impacted in the pelvis. Both may produce pain and require surgical intervention. Which operation is to be done first? Most orthopedic surgeons will agree, I believe, that they would prefer to have the contributing sources of pain eliminated before recommending surgery for the back.

Pelvic Pain Without Evidence of Disease

In the presence of a palpable lesion in the pelvis there is less confusion as to the source of pain than when minimal or no disease can be demonstrated. *Beware of operating for pain alone in the absence of pelvic pathology.* Too frequently an adequate explanation of the cause is not found and all too often ill-advised operations are performed which bring little satisfaction to either patient or surgeon.

There are a few exceptions such as primary dysmenorrhea. This is the most common entity of pain without a pathologic process. It is a symptom complex which appears in young girls who are ovulating. The distress varies from mild cramps to incapacitating pain. Surgical intervention is indicated only in the presence of the most severe pain. As a brake to overly enthusiastic surgery it is well to remember that the process is self-limiting and that there is a large psychogenic element.

There are two types of pain in dysmenorrhea, each with a different mechanism. Sixty per cent of patients will have midline cramps. The other 40 per cent will have constant grinding pain radiating to the back and down the legs to the suprapubic area.

What is the probable explanation of the cramps and how does it relate to surgery? Dysmenorrhea occurs only when ovulation has taken place and progestin has been produced. Progestin tends to create vasoconstriction of the terminal vessels of the endometrium with the result that areas of ischemia appear in the myometrium. Any muscle contraction in the face of damaged muscle is exquisitely painful.

Presacral neurectomy should relieve this type of pain. How does it do this? It may do it through interruption of the path of painful stimuli from the uterus to the cervix, but there is another reasonable explanation. Experimentally, if you stimulate electrically the distal end of a severed presacral nerve the uterus does not contract but alternate flushing and blanching of the uterus occur. This suggests that the sympathetic is concerned with blood vessel control relieving vasoconstriction. Pain is controlled in this manner. Since presacral neurectomy tends to create vasodilatation, it is evident that it should not be done in the presence of pelvic congestion.

Presacral neurectomy is a useful operation provided (1) it is employed only when pain is incapacitating and all other forms of treatment have failed; (2) the pain is confined to the mid-line; (3) the dissection is performed extensively enough to interrupt all the ramifications of the nerve. It is a dissection, not a division of the nerve. Little is accomplished by taking a small block of the nerve at the sacral promontory. The pain must be midline. The operation will do no good for the so-called lateral or ovarian pain and it will not relieve backache. Ovarian pain can be relieved only by dividing the ovarian vessels. This operation, while common abroad, has had few advocates in this country. Presacral neurectomy is most useful in the patient who has severe cramps.

For the patient who has the grinding, bearing-down type of pain, dilatation of the cervix or resection of Frankenhäuser's ganglion is a useful procedure. This type of pain has parasympathetic distribution through the second, third and fourth sacral nerves. In contrast to stimulation of the presacral nerve, electrical stimulation of the parasympathetic nerves in the broad ligament does not cause the uterus to flush or blanch, but rather the uterus contracts violently. Dilatation of the cervix helps not by relieving obstruction as was formerly supposed but by stretching and disrupting the fibers of Frankenhäuser's ganglion in and around the cervix. This is the pain center of the uterus. Dissection of the plexus by excising the peritoneum and underlying connective tissue between and including the uterosacral ligaments removes the plexus. This grinding

type of pain is common to secondary as well as primary dysmenorrhea. Good results are also obtained with resection in this group.

Despite the satisfactory response to surgery in dysmenorrhea where pathology is absent or minimal, it is important to restate that the surgeon should beware of performing operations for the relief of pain alone in the absence of pathology.

Relief of Pain in Malignant Disease in the Pelvis

Patients with extensive pelvic malignancy have increasing degrees of extreme pain in the pelvis. Pain is a frightening thing. Once started, it tends to maintain itself, thereby establishing a vicious circle. Pain produces vasoconstriction which may redouble the pain. Total incapacity and physical deterioration go hand in hand with drug addiction. It is our obligation as physicians to make our patients' lives as tolerable as possible. We cannot dodge our obligation when we have lost all hope of curing the patient.

Sympathectomy for pelvic visceral malignancy offers nothing. Chordotomy offers a great deal to the patient who has intolerable pain and a limited life expectancy. In my experience it has not been done early enough. There is a natural reluctance to suggest further surgery to a patient who has only a short time to live. It is preferable to committing a patient to a life made tolerable only by increasing use of opiates. On such a regimen the patient loses not only weight, appetite, bowel function, locomotion and mental clarity but hope as well. A well-performed chordotomy creates very little residual disability. The number of patients who have incisional pain, bladder dysfunction or difficulty in locomotion following chordotomy are increasingly few. When properly done before drug addiction or introspection has all but destroyed the patient through its distressing side effects, rehabilitation is possible and the results are gratifying. The course of the disease remains unchanged but the pathway to the end has less horrors. This is the prerogative of a good physician.

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Translumbar Aortography

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EVEN though translumbar aortography has been in use for over 25 years, many physicians still are not familiar with its diagnostic applications. I have prepared this review in the hope of providing an added impetus to further popularization of this procedure. The cases that are described illustrate the indications and range of applicability of this important diagnostic method.

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I do not wish to imply that translumbar aortography should be used as a routine diagnostic measure, since most renal parenchymal lesions can be diagnosed by more orthodox methods. It is recommended only when these other diagnostic methods fail. It will, however, prove quite useful in diagnosis of lesions of the abdominal aorta and its branches.

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Complications and Fatalities

Abdominal arteriography was first described by dos Santos, Lamas and Caldes[1] in Paris in 1931. They reported its use in 300 cases with no fatalities. Nelson[2] in 1945 was the first to describe the procedure in this country, reporting 73 cases with no sequelae. Melick and Vitt[3] reviewed about 3000 cases from the literature without evidence of fatalities, and Melick, Boler and Black[4] reported on the use of this technic in an infant.

Reports of complications due to translumbar aortography have been few indeed.[5,6] Serious reactions to the radiopaque iodine compound have been noted only occasionally, and fatal reactions even less often. Dos Santos, in later reports, noted four deaths after abdominal aortography using concentrated sodium iodide solutions. In 1954, Josselson and Kaplan[7] reported a fatality after the use of NEOIOPAX® for aortography. Severe toxic changes occurred in the hypertrophied right kidney of a hypertensive patient being studied because of left-sided pyelonephritic renal atrophy. Landelius[8] reported a fatality after the use of 17

cc. of 70 per cent umbradil in a four year old child with chronic pyelonephritis. Aortography was performed by retrograde catheterization through the exposed right femoral artery. In the case of fatal renal failure reported by Conger, Reardon and Arey,[9] a 12 year old hypertensive girl died after aortography using 20 cc. of 70 per cent UROKON® (sodium acetrizoate). Inspection of the published roentgenograms revealed that a portion of the contrast medium had been injected inadvertently into the wall of the aorta.

Alwall and associates[10] described two fatal renal reactions after aortography. In one, all of the 30 cc. of 70 per cent umbradil used entered the right kidney. The tip of the needle was located opposite the orifice of the right renal artery. The injection was repeated, using the same amount of contrast material to opacify both kidneys, thereby revealing a tumor of the left kidney. In the other fatal case reported by Alwall and associates, 50 cc. of 70 per cent Trijodyl (sodium acetrizoate) was used. Uremia occurred and death followed in 34 days.

In 1956, Baurys[11] reported a fatal case of paraplegia after aortography. The contrast medium used was not identified. The aorta was entered with difficulty, and several needle punctures were necessary before the needle was introduced into the aorta. This trauma may have been instrumental in causing the paraplegia by injuring the spinal arteries. Baurys also mentioned two cases of paraplegia which previously had come to Nelson's attention, one having occurred in Europe and the other in Canada. Practically no data were available relating to these two cases except that both patients survived. We do not know whether or not the performance of the procedure was complicated.

Also in 1956, Abeshouse and Tiongson[12] reported a case of paraplegia after aortography using 30 cc. of 70 per cent Urokon. The patient died about five months later from generalized carcinomatosis secondary to renal neoplasm. Autopsy revealed intense demyelination of the thoracolumbar portion of the spinal cord. There was no evidence of thrombosis of the anterior spinal artery (anterior radicularis magna) or of its branches which supply this portion of the cord. Abeshouse and Tiongson felt that the damage to the cord was due to direct toxic action of the 70 per cent Urokon.

A case of temporary paraplegia after aortography was reported by Boyarsky[13] in 1954. The contrast medium used was 70 per cent Urokon. Six to eight attempts at puncturing the aorta were necessary before the needle finally was introduced. In the description of the aortogram it was noted that the renal vessels filled unevenly and that the aorta was not filled close to the insertion of the needle but was outlined at a lower level with deviation to the left of the mid-line. The right iliac artery was filled but the left was not. Boyarsky also mentioned a case of paraplegia noted by Antoni and Lindgren in 1949. It followed the use of 70 per cent DIODRAST®. A description of the aortogram indicated that a portion of the contrast material was located perivascularly and that the aorta was irregularly filled at the level of injection.

Gaylis and Laws,[14] who reported two cases of dissection of the aorta during aortography, suggested that the paraplegia noted by Boyarsky and by Antoni and Lindgren could have been secondary to injury of the anterior spinal artery as the result of inadvertent dissection of the aorta. If a portion of the needle tip enters the opposite wall of the aorta, the needle opening may be located in such a manner that the forceful jet of injected material may enter both the aortic lumen and the aortic wall with subsequent aortic dissection. Even if only a portion of the needle opening lies within the aortic lumen, the return flow of blood into the polyethylene tubing connected to the base of the needle may give a false sense of security. As I shall describe later, careful localization of the needle tip prior to injection of the contrast material is of paramount importance. The two patients with aortic dissection described by Gaylis and Laws recovered without sequelae.

Accidental injection of the entire mass of contrast material into a single aortic branch such as the splenic, superior mesenteric or renal artery has been reported many times, without incident.[5,15] A few complications have

also been noted, however. McAfee and Willson mentioned a report by Wagner and Price in 1950 of an accidental death following the injection of 80 per cent solution of sodium iodide into the superior mesenteric artery during aortography. According to Maluf and McCoy,[6] deaths occurring in a similar manner were also reported by Doss and Sante after the use of sodium iodide. The fatalities reported by dos Santos included similar instances. In 1954, Fry[16] reported a case of acute renal failure and death after aortography using 100 cc. of 70 per cent Urokon. The patient already had some impairment of renal function prior to the procedure. The point of the injecting needle was located in the aorta between the orifices of both renal arteries so that both kidneys received a substantial amount of the contrast medium. It is possible that death resulted from the combination of renal dysfunction and flooding with the contrast material.

Of the few nonfatal complications which have been reported after aortography, I shall mention several of the recent ones. Miller, Wylie and Hinman[17] described seven cases of renal reactions of varying severity after the use of 70 per cent Diodrast for evaluation of atherosclerotic disease of the aorta. In three of these seven cases the tip of the injecting needle was misdirected so that a considerable quantity of the contrast medium entered the right renal artery. Moreover, in two of these three cases, 50 cc. of the 70 per cent Diodrast was injected with a gas-driven pressure machine. Renal atrophy occurred subsequently in one case. In the third case, two needles were used, and 70 cc. of 70 per cent Diodrast. One of the needles was directed toward the lumen of the right renal artery, while the other was felt to have been directed outside the aorta. There was excessive injection of contrast medium into the right kidney, with extravasation around the aorta and right renal artery. Immediately after the procedure the patient's blood pressure rose to 220/110 mm. Hg. Right renal failure occurred. Not until 13 weeks later did renal function return to normal on the right side and the blood pressure return to 140/90 mm. Hg.

Gaylis and Laws referred to the case just described and stated that the hypertension was "presumably due to renal ischemia, the result of dissection along a renal artery producing a Goldblatt type of renal lesion."

The remaining four of the seven nonfatal renal reactions reported by Miller, Wylie and Hinman involved renal failure with oliguria. In three of the cases, the two needle technic was used and more than 60 cc. of contrast material was injected. Since two of these patients had occlusion of the aorta, a considerable amount of the opaque compound entered the kidneys. In the fourth case, the gas-pressure machine was used to inject 50 cc. of 70 per cent Diodrast. Two of these four patients also demonstrated signs of Diodrast sensitivity.

McAfee and Willson[5] described a case in which complete loss of renal function with atrophy of the right kidney followed the use of 70 per cent Urokon for aortography. Local anesthesia was employed, and movement of the patient apparently caused the tip of the injecting needle to be localized opposite the orifice of the right renal artery. The right kidney received most of the contrast medium, and a prolonged nephrographic effect was noted on the films.

Acute pancreatitis in a patient with mild diabetes who was being studied for aortic occlusive disease was reported by Robinson[18] in 1956. A portion of the 70 per cent Urokon used was accidentally injected into the celiac axis. When this was discovered, the needle was withdrawn and reinserted into the aorta for completion of the study. The patient recovered from the insult and was well enough about two months later to undergo a homologous aortic graft procedure. However, the patient died on the second postoperative day.

Neither the accidental periaortic extravasation of contrast material nor the inadvertent formation of a hematoma as the result of aortic puncture has produced serious sequelae.[2,5,15] However, McAfee and Willson[5] reported a fatality from renal failure secondary to a retroperitoneal hematoma following translumbar aortography performed under local anesthesia. An aortogram was first obtained with the patient prone, but in an effort to rule out

the presence of a mobile kidney the patient was then placed in the semierect position and another aortogram was made after a repeated injection. A total of 50 cc. of contrast material was used. McAfee and Willson were not aware of any report of a similar occurrence, nor am I. The change in position may well have been instrumental in causing the formation of the large hematoma.

Except for the deaths mentioned, I do not know of any other reports of fatalities occurring as the direct consequence of translumbar aortography, although others may have occurred. Considering the thousands of aortograms which have been made since inception of the aortographic technic, the number of fatalities and other complications is quite small and should not be a deterrent to further use of this diagnostic method in properly selected cases. Moreover, aortography should be performed by an experienced operator, thereby decreasing the chances of complications further.

Contraindications

Aortography should not be attempted in the presence of acute nephritis, uremia, severe hepatic damage, advanced tuberculosis, severe hyperthyroidism, or iodine sensitivity as established by history or a sensitivity test.[15, 19] Leriche cautioned against use of aortography in the considerably overweight patient suspected of having vascular thrombosis or when there is marked cyanosis of the lower extremities or evidence of cardiac failure, for fear of causing a fatal extension of the thrombotic process.[15]

Technic

The technic used to obtain the aortograms reproduced herein is much the same as that which already has been well described in the literature.[1-3, 6, 15, 19] The patient is placed in the prone position under local sodium PENTOTHAL® anesthesia to secure adequate cooperation and proper muscular relaxation. A scout film of the abdomen is first made to assess the correctness of the radiographic factors. Observing sterile precautions, a 6 in., 17 gauge needle is inserted through the skin of the back at a point 8 cm. to the left of the mid-line at the lower margin of the twelfth rib, or at the level of the twelfth thoracic vertebra if the twelfth rib is absent. The needle is then directed cephalad and at a 45 degree angle toward the mid-line until the tip is felt to strike the lateral margin of the body of the twelfth thoracic vertebra. It is then redirected so that the tip slips by this vertebra, and advanced further until the pulsating aorta is felt, whereupon the needle is thrust into the lumen of the aorta well above the level of the celiac axis. The tip of the needle is accurately localized by exposing a film of the abdomen during the injection of 4 or 5 cc. of the opaque medium. This is mandatory in order to obviate accidental injection of the entire mass of contrast material directly into the aortic wall or any of the aortic branches, and to assure proper visualization of all these important branches.

It should be noted that many of the complications of aortography and particularly several of the deaths occurred in conjunction with some variance of the recommended technic. In many cases either the needle was improperly placed or more than 50 cc. of contrast medium was used. The compounds involved in the several complications reported include sodium iodide solutions, 70 per cent Urokon, 70 per cent Diodrast, 70 per cent umbradil, 75 per cent Neo-Iopax, and 70 per cent Trijodyl (same as 70 per cent Urokon).

After the needle has been properly inserted into the aorta, a total of 20 cc. of 50 per cent HYPAQUE® (sodium diatrizoate) is employed for completion of the study. I am not aware of any reported complications after use of this medium. A 50 cc., wide-bore Robb syringe has proved quite satisfactory for manual injection of the material. Polyethylene tubing No. 320, with an inside diameter of 2.69 mm. and having Clay-Adams adapters at both ends, may be connected between the needle and syringe. The tubing may be sufficiently long so that the surgeon may stand behind a protective lead screen while injecting during exposure of the films. It is rigid enough not to expand during forceful manual injection.

It is important to inject the contrast medium as rapidly as possible so that the entire quantity enters the aorta in two to three sec-

onds. An automatic pressure injector may be used but extreme care should be exercised in the prior placement of the needle, as already mentioned.

Suggested radiographic factors include an average of 80 kv for an adult whose posteroanterior diameter is 20 cm., using 300 milliamp. and an exposure time of two-tenths second at a 36 in. target-film distance. The Bucky diaphragm and cassettes having Patterson par speed screens are also used. Cassettes may be changed rapidly by hand. However, the various serialographic devices give better results, with exposures made at 30 second intervals. Exposures should begin as the first 5 cc. of contrast material is being injected. A total exposure of six seconds will usually suffice to evaluate suspected renal lesions, with additional exposures obtained at 10 and 15 seconds after injection to assure visualization of the delayed nephrogram, should one occur in this time. If aortic thrombotic disease is suspected, exposures at one second intervals for 10 seconds will be ample to demonstrate obstruction to the flow of the contrast medium. If desired, a film of the abdomen for pyelographic demonstration may be exposed about 10 minutes after the aortographic injection has been completed.

Important Uses of Translumbar Aortography

One of the more important uses of translumbar aortography involves an attempt to differentiate malignant and benign renal lesions. In the presence of a parenchymal neoplasm such as hypernephroma the aortogram will demonstrate pooling of the contrast medium in arterial and venus sinuses formed by neoplastic vascular erosion. One will also see increased vascularity, a completely irregular vascular pattern, and spiderlike vessels in the region of the neoplastic lesion. Figure 1 illustrates these findings in a case of hypernephroma involving the upper pole of the left kidney. The presence of dilated veins extending to the vertebral venous system and draining the renal area is compatible with that of arteriovenous fistulas within the renal neoplasm itself.

A few instances of renal adenocarcinoma have been recorded in which these findings were not observed.[3, 15, 19, 20] Therefore, one should not be misled by their absence. Their presence, however, is significant.

FIGURE 1. Hypernephroma, left kidney. Aortogram demonstrates pooling of the contrast medium in the tumor in the upper pole. White arrows indicate tortuous, spiderlike vessels. Black arrows outline left renal vein. Collapsed first lumbar vertebra is opacified by contrast material inadvertently injected into it during first attempt at aortography as noted on an initial scout film. Residual PANTOPAQUE® is present in the spinal canal at the level of L_4-L_5.

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Aortograms will demonstrate absence of renal vasculature at the site of benign renal space-taking lesions such as single or multiple renal cysts. The interlobar and interlobular vessels are elongated, attenuated and deviated apart. Similar findings are noted in cases of advanced caliectasis as well as in polycystic disease of the kidneys. Figure 2 demonstrates the typical aortographic appearance of a large benign renal cyst. Again, however, one must exercise caution in assessing these films, since transitional cell or squamous cell neoplasms

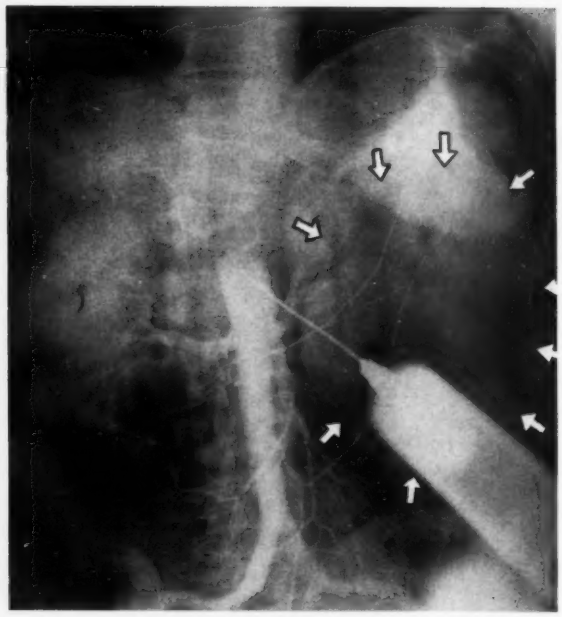

FIGURE 2. Benign renal cyst. Renal vessels are all displaced medially, and the remainder of the renal outline (indicated by arrows) is completely avascular.

FIGURE 3. Left renal agenesis. Complete absence of left renal vasculature and outline. Right kidney is hypertrophied.

of the renal pelvis may also produce findings indicative of space-taking lesions.[3, 15, 20]

Although it may be difficult at times to distinguish between malignant and benign renal lesions, nevertheless aortography is quite useful, particularly if the findings are typical of malignancy. The procedure will aid in planning an appropriate surgical approach. Many urologists advocate the anterior transperitoneal approach to allow for adequate dissection during removal of malignant lesions. In cases of benign renal lesions the retroperitoneal lumbar approach is used.

Aortography may prove valuable for further evaluation when the kidney is not visualized by means of intravenous urography. The aortogram in such a case is shown in figure 3. The patient was undergoing a general evaluation during hospitalization for duodenal ulcer. An intravenous urogram was made, and the contrast medium did not appear on the left side, suggesting the possibility of a nonfunctioning kidney. Retrograde pyelography was impossible because a catheter could not be passed into the left ureter more than about 0.5 cm. from the ureteral orifice. The aortogram revealed complete absence of renal vasculature on the left side, indicating either complete renal atrophy on the basis of a possible obscure childhood renal infection, or renal agenesis. Since the patient did not complain of urinary symptoms and responded well to ulcer therapy, operation was not indicated. It was felt that the aortogram most likely represented renal agenesis.

Lesser degrees of secondary renal atrophy are demonstrated by the diminutive nature of the renal artery and branches in a small kidney which appears relatively avascular. Figure 4 represents this type of renal involvement and also demonstrates an aneurysm of the renal artery to the involved kidney. This aneurysm was totally unsuspected prior to aortography. The patient was being studied because of unexplained hypertension. Nephrectomy was performed subsequently, and the hypertension was relieved. Pastor and associates[21] reported this case in detail. Translumbar aortography was of inestimable value in the final diagnosis of the lesion.

FIGURE 4. Aneurysm of right renal artery. The previously unsuspected lesion is indicated by the white arrow. An accessory renal artery (black arrow) also supplies the atrophic right kidney.

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In another case, translumbar aortography demonstrated preoperatively a large arteriovenous fistula of the renal vessels in a patient with elevated systolic blood pressure, cardiac enlargement and failure, and a loud vascular bruit over the left upper part of the abdomen (figure 5). Nephrectomy effected a cure. My associates and I[22] described this case in detail in a previous report.

Translumbar aortography is useful in completing the urologic evaluation of ectopic kidney by demonstrating the origin and status of

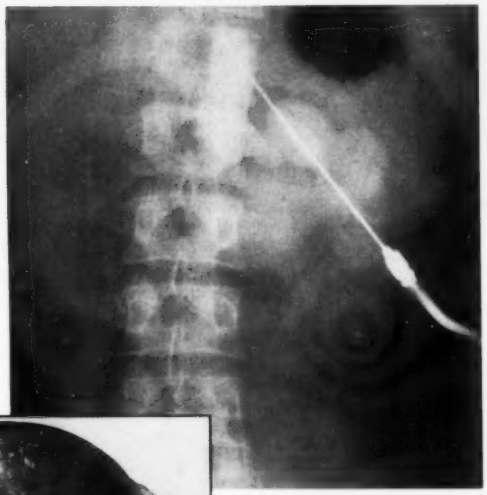

FIGURE 5a. Arteriovenous aneurysm of the left renal vessels. Hugely dilated renal veins are opacified. Fleeting opacification of the lesion due to rapid blood flow necessitated use of automatic Fairchild serialographic camera.

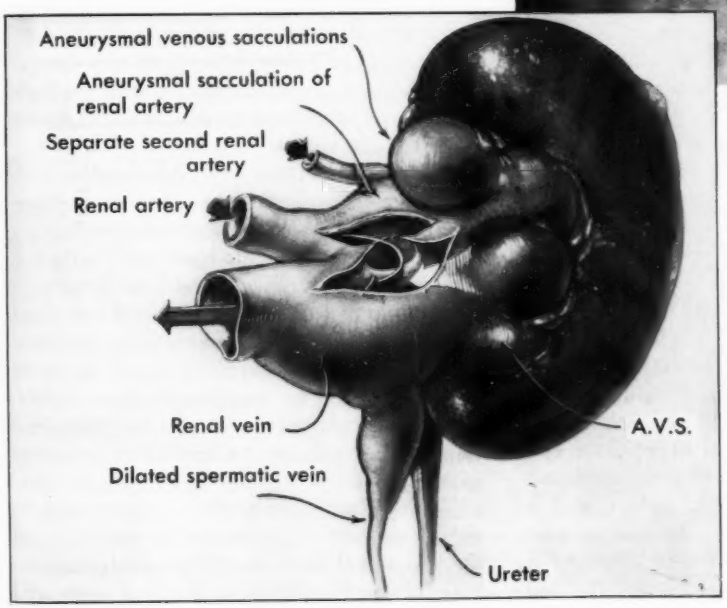

FIGURE 5b. Artist's drawing of the lesion (anterior view, left kidney and vessels).

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FIGURE 6. Bilateral renal ectopia. Ectopic left kidney is fused to lower pole of ectopic right kidney. White arrows indicate origin and course of left renal artery. Black arrows outline right renal artery.

the blood supply to the involved kidney. Figure 6 illustrates a crossed ectopia of the left kidney with fusion to the lower pole of an ectopic right kidney, both located in the right lower quadrant of the abdomen. The renal arteries originate from both sides of the aorta at a point about 0.5 cm. above the bifurcation, with the artery to the ectopic kidney crossing the mid-line from the left side. While the position and function of both kidneys were evident on an intravenous urogram, the important status of the blood supply was not known until the aortogram was made. This information would be important if surgical intervention became necessary.

Aortography permits further evaluation also of other congenital lesions of the kidney. Figure 7 illustrates a unilateral hypoplastic kidney on the left side with a diminutive blood supply, and an enlarged right kidney with a commensurate vascular tree. Urography previously had revealed incomplete duplication of the right renal pelvis and ureter. The left ureter appeared normal; however, at cystoscopy an apparent congenital blind pouch was noted at the site of the left ureteral orifice. Here, again, the status of the renal blood supply was not known until the aortogram was obtained. It revealed the presence of only one large renal artery supplying the right kidney, and a normal vascular tree in the left kidney, which was normal except for the diminutive size. This finding is in keeping with renal hypoplasia, probably congenital.

Through the use of translumbar aortography one may differentiate a congenitally hypoplastic kidney and an atrophic kidney secondary to any vascular impairment or to chronic pyelonephritis. Aortographic findings in calicctasis already have been described. In secondary renal atrophy the aortogram will disclose a small, relatively avascular kidney with a poorly delineated blood supply. If renal function is good, an immediate nephrogram will be noted on films exposed within three to four seconds after injection of the contrast material. If renal function is poor, the nephrographic effect will be diminished in intensity; in cases of severe renal damage it will not appear at all.[6]

In certain instances, aortography is of definite value in making surgical decisions. Demonstration of a poor blood supply to a kidney which could still show reasonable excretion of urographic contrast material would preclude removal of another obviously hydronephrotic or caliectatic kidney.

A more conservative procedure would be indicated such as ureteroplasty in certain types of ureteral obstruction. Aortography simplifies the diagnosis of aberrant renal arteries. This is important in cases of hydronephrosis or pyelectasis caused by pressure from these arteries. Moreover, it demonstrates the portion of the kidney supplied by an aberrant artery. Removal of an aberrant artery supplying a significant portion of a kidney may lead to renal necrosis or to secondary ischemia with resultant hypertension.

Translumbar aortography is important in the demonstration and evaluation of lesions of the abdominal aorta and iliac vessels. Thrombotic obstruction of the abdominal aorta and

branches due to atherosclerosis is easily revealed, even though diagnosed clinically by the presence of exertional pain low in the back, in the hip and in the thigh, and, in males, by the inability to maintain an erection in the presence of saddle thrombus. Good femoral pulsations will still be noted in the presence of an adequate collateral circulation. However, absence of femoral and popliteal pulsations indicates extension of the thrombotic process. It is important to diagnose this lesion before extension occurs, so that a proper surgical procedure such as thrombo-endarterectomy or use of homografts or vascular prosthesis may be performed.[23,24] An aortogram will aid in planning the surgical procedure, and in some instances it may obviate surgical intervention—if the thrombotic process is extensive and if bilateral renal damage already has occurred. Aortograms also will reveal the location of the major collateral vessels so that they can be preserved during the operative procedure. In the event that the iliac and femoral vessels are not opacified in the presence of complete occlusion of the lower abdominal aorta, and if good femoral pulsations are present, these vessels still may be visualized and properly evaluated by the method of retrograde percutaneous catheterization of the femoral arteries.[25] This is also important in planning the surgical procedure, particularly with reference to the continued patency of a vessel graft.

The aortogram will demonstrate the size and type of an abdominal aortic aneurysm, particularly if it is difficult to diagnose clinically. Here, too, the involved portion of the aorta may be resected and replaced by homografts if contraindications to such a procedure do not exist.[26] From 42 to 70 per cent of the patients in two series of cases of untreated aneurysm of the abdominal aorta were dead within three years after symptoms were first noted.[24]

Figure 8 represents the aortographic demonstration of thrombotic occlusion of the aorta. Figure 9 demonstrates a recanalized thrombosed aneurysm of the aorta. Neither patient was treated surgically because of a combination of extensive aortic and iliac vessel involve-

FIGURE 7. Left renal hypoplasia. Arrows outline small kidney with diminutive vascular supply. Right kidney is hypertrophied. Incomplete reduplication of right urinary tract was noted on previous intravenous urogram, suggesting congenital abnormality.

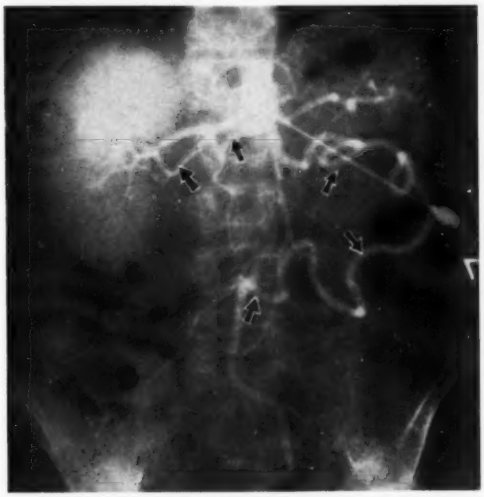

FIGURE 8. Complete thrombotic occlusion of aorta at level of renal arteries. Left renal artery is not visualized. Right kidney and vascular tree are hypertrophied. Arrows indicate greatly dilated marginal artery of Drummond in the colonic mesentery, anastomosing the superior mesenteric vascular system to hypogastric vessels via the superior hemorrhoidal vessels. The external iliac vessels are not visualized.

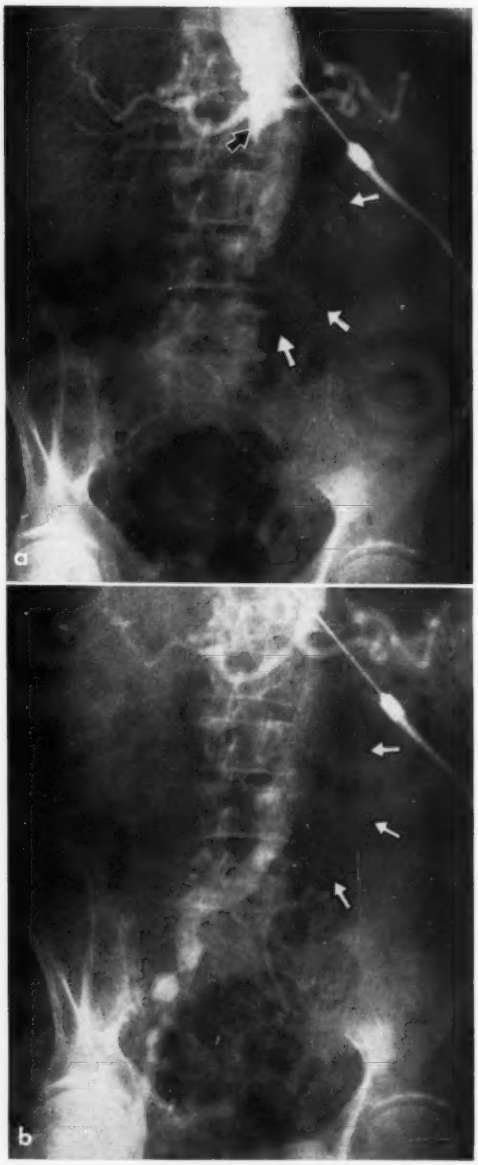

FIGURE 9. Recanalized thrombotic aneurysm of aorta. A portion of the aneurysm is noted above the level of the renal vessels, while below this level recanalization has occurred. Left renal vessel is not visualized. Right kidney is hypertrophied. White arrows indicate the faintly calcified outline of the aneurysm. Right iliac vessels are tortuous, aneurysmally involved and patent. Left iliac vessels are occluded. A dilated collateral vessel is noted in relation to the white arrows, and located in the colonic mesentery.

ment and a markedly poor physical status.

Further evidence of the range of applicability of aortography is its usefulness in diagnosis of other intra-abdominal lesions. The demonstration of retroperitoneal sarcomas, benign and malignant lesions of the spleen, adrenal malignancy, chorio-epithelioma and hydatid mole has been reported.[15, 19, 27] The placenta also has been demonstrated.[15] This is useful in diagnosis of placenta praevia or even abdominal pregnancy. All these entities involve the presence of tortuous blood vessels and the pooling of contrast medium in vascular sinusoids.

The aortograms reproduced herein were obtained at the Veterans Administration Hospital in Philadelphia during the years 1953 and 1954. Since 50 per cent Hypaque was not yet in general usage at that time, 70 per cent Urokon was employed. These nine aortographic studies represent part of a total of 25 obtained during the first two years of operation of a new general hospital. Of the remaining 16, two confirmed the presence of aortic aneurysmal or thrombotic disease, four were important in excluding the presence of suspected renal tumors, and 10 were essentially normal. The latter 10 aortograms were part of studies conducted because of hypertension, chronic renal disease, possible renal vascular impairment, and peripheral vascular disease. In one case of chronic renal disease the patient later underwent left ureteronephrectomy for chronic granulomatous pyonephrosis and ureteritis. The aortogram was of value in that it demonstrated a good blood supply to the opposite kidney.

Conclusion

Translumbar aortography is a safe diagnostic method if it is performed carefully as outlined in this discussion. In properly selected cases it is extremely rewarding and of considerable importance in the accurate diagnosis of certain renal and other intra-abdominal vascular lesions. It may provide the answer to unexplained hypertension and will undoubtedly be of value in planning surgical procedures, perhaps even obviating operative intervention in certain instances.

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MEETINGS and Postgraduate Courses

American Academy of Pediatrics, New York: Spring session, April 21-23 at the Hotel Statler. For further information, write to: Executive Office, 1801 Hinman Avenue, Evanston, Ill.

Harvard Medical School, Boston: Postgraduate course in gynecology, April 28-May 2 at Free Hospital for Women; course on recent advances in internal medicine, June 2-7 at Peter Bent Brigham Hospital. For further information, write to: Assistant Dean, Courses for Graduates, Harvard Medical School, 25 Shattuck Street, Boston 15.

Industrial Health Conference, Atlantic City: April 19-25 at Convention Hall. The conference includes meetings of the American Conference of Governmental Industrial Hygienists, American Industrial Hygiene Association, American Association of Industrial Dentists, American Association of Industrial Nurses, Inc., and Industrial Medical Association. For further information, write to: Industrial Health Conference, 28 East Jackson Boulevard, Chicago 4.

International Association of Allergology, Paris, France: Third international congress, October 19-26. For further information, write to: Dr. Bernard N. Halpern, 197 Boulevard St. Germain, Paris 7.

National Foundation for Infantile Paralysis, New York: Fellowships for short courses in tissue culture are available to postdoctoral investigators, teachers, graduate students and experienced laboratory personnel with a baccalaureate degree. For further information, write to: Division of Professional Education, National Foundation for Infantile Paralysis, 301 East 42nd Street, New York 17.

Stanford University School of Medicine, San Francisco: Annual spring postgraduate conference in ophthalmology, March 31-April 4. For further information, write to: Office of the Dean, Stanford University School of Medicine, 2398 Sacramento Street, San Francisco 15.

Western Reserve University Law-Medicine Center, Cleveland: Fifth annual institute on science in law enforcement will be held June 16-21. For further information, write to: Oliver C. Schroeder, Jr., The Director, Law-Medicine Center, Western Reserve University, Cleveland 6.

World Health Organization Assembly, Minneapolis: May 26-June 14. For further information, write to: Dr. R. N. Barr, Secretary and Executive Officer, Minnesota Department of Health, University of Minnesota, Minneapolis 14.

Diabetic Retinopathy

WILLIAM H. HAVENER*

Ohio State University, Columbus

ANY of the wide variety of retinal changes associated with diabetes may be present in other diseases and therefore none are pathognomonic of diabetes. Nevertheless an experienced ophthalmoscopist can confidently diagnose diabetes on the basis of proper distribution of certain characteristic features of the disease.

WILLIAM H. HAVENER

Retinopathy does not appear until diabetes has been present for a number of years, and therefore a large group of patients with early diabetes will not have retinal changes. Recognizable changes first appear in the posterior pole of the eye, are often concentrated about the macula, and usually extend only out to the midperiphery except in severe cases. The distribution of the alterations is fairly uniform unless disease of a vascular branch accelerates the damage in its tributary region. Bilaterality is the rule, but more often than not the severity of involvement differs in the two eyes.

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Components of Diabetic Retinopathy

Micro-aneurysms—Small, rather bright red dots, rounded or oval, are sharply outlined although they may cluster so closely that they almost seem to coalesce. Rarely will a microaneurysm exceed the diameter of an artery at the disk, and most of them are much smaller.

Neovascularization—At first an exceptionally fine capillary network is detected, resembling a hemorrhage thinly spread on the retinal surface. As these vessels grow they remain readily recognizable as pathologic by their extreme tortuosity. Less commonly, vessels and accompanying supporting tissue proliferate into the vitreous. These new vessels are continuous with the main retinal vasculature.

Newly formed connective tissue—This component refers to the meshwork which, in varying amounts, always accompanies diabetic neovascularization. Ophthalmoscopically invisible at first, it eventually forms a peculiarly irregular, glistening sheen on the inner retinal surface or may extend throughout the vitreous in strands or sheets. This tissue may develop in-

dependently of neovascularization; however, the two processes ordinarily are mixed in varying proportions.

Hemorrhages—Many types of hemorrhage accompany diabetic retinopathy. Scattered small hemorrhages differ from micro-aneurysms in that they have indistinct margins. Irregular patches composed of multiple small hemorrhages tend to exist in the neighborhood of micro-aneurysms or neovascularization and probably originate from rupture of vessels or diapedesis through the fragile walls of newly formed vessels. Contractures of connective tissue sometimes cause superficial retinal hemorrhages due to consequent tearing of associated vessels. Vitreous hemorrhages represent forward extension of similar but more extensive hemorrhagic tendencies.

Discrete, waxy exudates—Waxy exudates may mimic benign drüsen in appearance, but with experience it is usually easy to differentiate the two. The waxy exudates have discrete borders, although adjacent exudates may be confluent. Owing to their relatively superficial location as compared with drüsen, their glistening, cream-colored, homogenous surfaces are seen in clear detail. Drüsen never form circular or radial patterns, and this is in contrast to exudates, which are frequently distributed in this manner. Macular exudates cause serious reduction in vision, which is not the case with drüsen.

Cotton-wool exudates—These are larger and more fuzzy in appearance and usually somewhat grayer than the waxy exudates. They do not appear early and seem definitely related to arteriolar disease.

Arteriolar changes—Arteriolar changes may be sclerotic or hypertensive. Widening of the light reflex, arteriovenous crossing changes, coppery discoloration of arterioles, and similar well-known features identify arteriolar sclerosis. Hypertensive disease betrays its presence by premature sclerotic change, focal or general attenuation of arteriolar caliber, and, rarely, papilledema.

Venous changes—These include slight fullness of the veins, not infrequently a hyperemic appearance of the disk, and rarely a peculiar beadlike dilatation of a venous segment. Neovascularization and micro-aneurysms should be considered as primarily venous disorders.

Ophthalmoscopic Diagnosis of Diabetes

Let us consider the features of diabetic retinopathy which are significant in the ophthalmoscopic diagnosis of diabetes. Only the first two, micro-aneurysms and neovascularization, are of real value. In the absence of venous occlusive phenomena or chronic inflammation, the diagnosis of diabetes is secure when one finds a characteristic random distribution of half a dozen typical micro-aneurysms in the posterior pole of one eye, with a few in the other eye, particularly if a fine patch of neovascularization is present.

Diabetes and the accompanying nephropathy hasten arteriolar disease, but the latter is not a pathognomonic diagnostic feature. Small hemorrhages are only suggestive, and the larger ones often represent simply hypertensive retinopathy. The finding of exudates is totally unreliable in determining the etiology of retinopathy.

One swallow does not make the summer, and neither do one or two micro-aneurysms make diabetic retinopathy. Isolated micro-aneurysms are found in other diseases including hypertension, glaucoma, inflammation and venous occlusion.

Histology of Diabetic Retinopathy

Micro-aneurysms vary in size and occasionally reach 100 μ in diameter. Those who do not fully appreciate the magnifying potential of the 60 diopter refractive power of the eye often express disbelief in the visibility of such a tiny structure. A simple calculation reveals that the 1.5 mm. optic disk is 1500 μ in diameter. The large arterioles at the disk margin have a diameter about one-fifteenth that of the disk and therefore are 100 μ in size. The resolving power of the observer's eye permits recognition of details one-tenth the size of a large retinal arteriole, indicating that the fine pigment granules often seen ophthalmoscopically in the fundus are single pigment cells. Unquestionably, therefore, micro-aneurysms are large enough to visualize easily with the ophthalmoscope.

Micro-aneurysms originate from the venous portion of the capillary bed. They may be situated on one side of the vessel or encompass its whole diameter. A vascular bifurcation may give rise to micro-aneurysms but this is not a site of predilection. Sometimes there are irregularities of the vessel wall in adjacent capillaries and venules, suggesting degenerative changes. Only rarely is narrowing of the lumina of tributary veins detectable.

The walls of micro-aneurysms are usually quite thin. Nearby hemorrhages frequently suggest fragility or increased permeability of these walls. A concentric lamination of hyalin often occludes the distal portions of micro-aneurysms and may obliterate them entirely.

Neovascularization also is primarily venous in character, the earliest budding capillaries clearly originating from the vein. A characteristically irregular, tortuous course identifies these new vessels. It seems likely that this tortuosity is due to two mechanisms, the more obvious of which is an irregular growth pattern. A second mechanism, contraction of accompanying connective tissue, may result in bizarre convolution of newly formed vessels or distort the pattern of the existing normal vessels.

A characteristic finding, although relatively rare, is a beadlike dilatation of the larger veins. Its cause is not clear but speculation might include localized weakening of vessel walls or constricting segments of connective tissue about the vein.

Does neovascularization precede hemorrhage or do new vessels grow into and organize pre-existing hemorrhages? Clinical experience suggests the former, since it is common to find early neovascularization without hemorrhage. Conversely, the majority of intraocular hemorrhages, excluding those associated with diabetes or venous occlusion, do not result in neovascularization. Finally, recurrent hemorrhages are most likely to occur when neovascularization is already present. Although these vessel walls are innately fragile and therefore predisposed to leakage of blood, we should not overlook the role of contracture of newly formed connective tissue in the rupture of vessels and the consequent hemorrhage.

Overgrowth of connective tissue seems always to accompany neovascularization of any severe degree. Cross sections readily demonstrate such a fibrovascular membrane but flat retinal preparations usually do not permit its identification. If the fibrous membrane tears, and the fibrovascular sheet subsequently retracts, discrete, sharp edges are easily recognized. These defects may be banana-shaped just as are some tears in Descemet's membrane. A large, semicircular tear may retract, leaving a folded straight edge like a taut bowstring. More extensive tears of the central fibrous sheet may retract into a grayish clump that protrudes slightly anterior to the retina. Recognition of this sheet and its retraction clarifies the appearance and behavior of proliferating retinitis. For example, why do we see ruler-straight bands of proliferating tissue? Such linear primary growth seems almost impossible, but retraction into a taut "bowstring" fold easily explains such configuration. How do vessels, pre-existing and newly formed, assume such bizarre convolutions? Such patterns form easily when contiguous adherent fibrous tissue contracts. Why do repeated small and large hemorrhages occur? Rupture of small vessels crossing a tear in the membrane explains some of them. (I have observed a somewhat similar mechanism cause a preretinal hemorrhage near but not in an area of chorioretinitis. A localized posterior detachment of the vitreous overlying the focus of chorioretinitis had torn a superficial retinal vessel in its periphery.) These membranes may become detached from the retina, leaving minimal retinal damage, and bleeding more often occurs from tears of the abnormal fibrovascular membrane than from the underlying retina.

No one will dispute the fact that in advanced stages of proliferating retinitis the entire retina is subject to traction detachment attendant on contraction of glial strands throughout the vitreous and on the retinal surface.

The rare but characteristic picture of lipemia retinalis appears during diabetic coma when the serum lipids exceed 3.5 per cent. Both arteries and veins become cream-colored.

Hypertensive hemorrhages and arterial attenuation may occur as part of Kimmelstiel-

Wilson disease. Arteriosclerotic indentations of the veins may cause thrombosis of the branches, often with subsequent macular degeneration. Spontaneous vitreous hemorrhages often owe their origin to diabetic retinopathy.

Comments

Students will be aware that identical ophthalmologic and histologic features exist in diabetic retinopathy and in occlusion of the retinal veins. Postulation of a similar pathogenesis for these retinopathies is almost unavoidable. Simple stasis has been invoked as a cause, and on this foundation rests the rationale of anticoagulant therapy of diabetic retinopathy. The absence of this typical type of retinopathy in cases of carotid cavernous fistula of long standing would seem to rule out the simple "back pressure" theory of pathogenesis. The supposition that accumulation of some metabolite or "organizer" induces formation of new vessels seems far more likely. Such an assumption would explain the growth of vessels in diverse conditions such as diabetic retinopathy, venous occlusion, rubeosis iridis diabetica, chronic uveitis, degeneration, neoplasm, lens-induced inflammation, corneal trauma, and indeed the normal growth of developing blood vessels.

Summary

Retinal micro-aneurysms or neovascularization, or both, located posteriorly and preferably bilaterally, are pathognomonic of diabetes *in the absence of* indications of venous occlusive phenomena or chronic inflammatory or degenerative disease.

Characteristic of diabetic retinal changes but representing nonspecific degenerative changes are such findings as exudates, hemorrhages, arteriosclerotic or hypertensive vascular changes, and connective tissue which is newly formed.

The cause of diabetic retinopathy is unknown but the hypothesis of vascular response to an accumulated metabolite is most attractive and serves as a unitarian theory that also explains other of the ocular vasoproliferative phenomena.

ACKNOWLEDGMENT

Dr. James Bloodworth, Dr. George Hamwi, Dr. Torrence Makley and Mr. Jack Prince gave valuable assistance in preparing this material.

Treatment of Traumatic Facial Injuries

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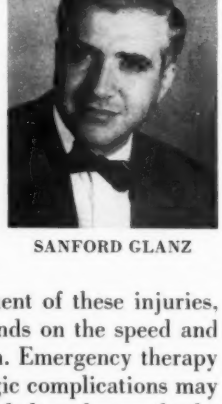

SANFORD GLANZ

THE increased tempo of our mechanical era, the high speeds of transportation, and the hazards of complex industrial existence have brought a marked rise in the incidence of severe and disfiguring injuries of the face. Almost every physician encounters the problem of immediate treatment of these injuries, and the final result depends on the speed and decisiveness of his action. Emergency therapy for generalized physiologic complications may be lifesaving, while knowledge of recently developed surgical technics often will save the patient from grotesque deformity or further reconstructive surgical procedures. The purpose of this paper is to outline a pattern of examination and primary treatment that physicians can follow almost routinely in the best interests of persons who receive traumatic facial injuries.

Presented before the ninetieth annual session of the Texas Medical Association at Dallas.

Primary Examination

If the injury is of such magnitude as to threaten life, one should set aside temporarily the meticulous repair of traumatic facial injuries to determine and stabilize the patient's general condition. The following sources of severe complication demand prompt recognition and care.

Hemorrhage—Hemorrhage should be controlled immediately, if possible, by exposure of the vessels involved and the use of hemostats or snug gauze packing. Attempts to stop hemorrhage using localized pressure alone may greatly aggravate facial injuries. Such compression applied over severely comminuted fractures may damage adjacent vital structures irreparably.

Airway—The airway should likewise receive prompt attention. Foreign materials such as broken dentures or particles of food must be removed from the mouth. Brisk hemorrhage may complicate through-and-through lacera-

tion of the cheek, forming an obstructive clot in the airway, and this should be aspirated. Injury of the larynx or edema severe enough to cause respiratory obstruction may necessitate immediate tracheotomy.

Shock—Appropriate measures should be instituted as soon as possible to prevent shock or to treat it if already present. Replacement of circulatory blood volume following excessive hemorrhage may preclude irreversible shock. Proper positioning of the patient is important, as is external warmth. Other useful measures in combating shock include elevation of the foot of the treatment table, adequate covering, and intravenous administration of new circulatory expanders, physiologic saline or whole blood.

Central nervous system—Intracranial damage frequently accompanies severe facial injuries due to the proximity of vital structures found in the central nervous system. Neurologic reflex studies and examination of the eyegrounds can help determine the presence and degree of intracranial injury. Attention to any intracranial disturbance takes precedence over repair of facial wounds, and when in doubt the physician should seek neurosurgical consultation.

Roentgenographic examination—One should obtain x-rays of any suspicious injury to the skeletal structures of the head. They may be simple anteroposterior and lateral films of the face. However, the Waters view, preferably obtained by a stereo technic, will be most useful. It will detect many fractures of facial bones that otherwise would be missed.

Surgical Repair

The patient's condition permitting, repair of facial wounds should proceed without delay. General preoperative preparation includes administration of tetanus antitoxin or booster toxoid and antibiotics of choice. Information in regard to antibiotic sensitivity is obtained if possible. Use of general anesthesia is indicated in all extensive injuries and in children. Local nerve block infiltration can be used when the injury is localized.

Wound preparation—The wound is cleansed manually with gauze pledgets. Further preparation is effected by use of chemical agents such as the newer detergents or a bland soap and profuse saline flushing. This reduces bacterial contamination, removes loose foreign bodies and clots, and permits evaluation of the trauma.

Debridement—Surgical debridement varies from simple removal of small portions of necrotic tissue to excision of large areas of obviously avulsed necrotic skin and completely detached bony fragments. One should avoid debriding too radically. A bluish discolored flap does not always indicate loss of skin. These flaps, sutured back into position, serve as full-thickness grafts and often survive as permanent coverage. Nonviable, blackish, jagged flaps are easily recognized and are sacrificed with conservative excision. I cannot emphasize too strongly the necessity of delicate technic in handling these tissues. Necrotic subcutaneous tissue such as muscle and fascia should be debrided primarily. Caution is necessary to avoid the possible removal of an important nerve while attempting to remove devitalized muscular tissue, particularly in the injuries along the path of the ramifications of facial nerves.

Closure of the wound—The principles of wound closure are essentially the same in facial injuries as they are in injuries elsewhere on the body. Meticulous approximation of all wound edges using fine suture material and instruments will achieve the best results. Careful closure of layers without tension is important, obtaining apposition of the deep tissues first to form a firm bed for closure of skin. Interrupted sutures of No. 4-0 or 5-0 catgut are frequently used in the deeper layers. We have also used No. 38 stainless steel wire sutures successfully in closing subcutaneous layers. This suture material has adequate tensile strength and does not create a foreign body reaction. After approximation by deep sutures the dermal layer may be closed with continuous subcuticular wire or No. 6-0 monofilament interrupted nylon sutures using atraumatic needles.

Dressings—Almost as important as the original surgical repair is the postoperative dressing of a traumatic wound. The external

FIGURE 1a. Avulsion and partial loss of scalp with exposure of bone. Automobile accident.

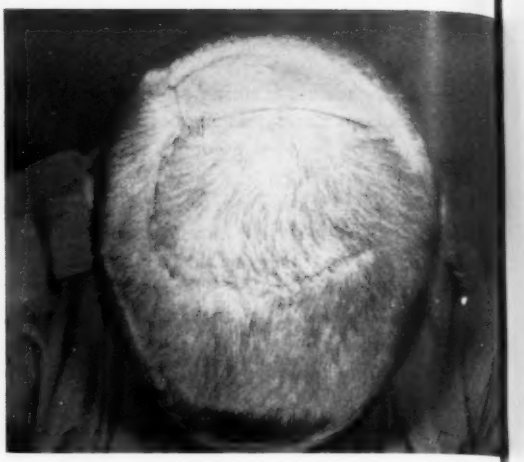

FIGURE 1b. Primary repair by large rotation pedicle flap directly over exposed skull with skin graft to donor site.

coverage not only should protect the sutured wound from contamination but also should promote healing by immobilizing the entire area. To accomplish this one may apply localized splinting or a bulky tie-over stent dressing, leaving the sutures about the periphery of the wound long and then tying them over a self-contained bolus. Adequate immobilization also enhances the patient's comfort. Movement of any injured area is painful, and excessive motion may increase scarring.

Dressings are changed within 48 to 72 hours for removal of exposed interrupted sutures. One may leave subcuticular wire sutures in place longer. Specific indications such as unexplained fever, pain and swelling about the injury may necessitate earlier intervention. However, changing the dressings too frequently will prolong healing and add to discomfort and postoperative scarring.

Trauma Involving Special Structures

In treatment of injuries of the face, more than any other body area, special structures require individual management in order to prevent deformity and loss of function.

Forehead and scalp—Injuries of the forehead and scalp (figure 1) often are stellate or U-shaped and attended by loss of soft tissue over the underlying frontal bone. With careful debridement and wide undermining of the edges of the wound one usually can obtain pri-

FIGURE 2a. Avulsion and loss of skin in part of right forehead, upper eyelid and cheek. Windshield injury.

FIGURE 2b. Layer closure of wounds with Z-plasty of eyelid and tarsorrhaphy to prevent contracture.

FIGURE 3a. Nasal fracture and displaced septum. Fist injury.

FIGURE 3b. Reduction of fractures and alignment of septum. Structural position maintained by internal packs and external splinting.

mary approximation. Closure by means of immediate adjacent pedicle flaps is difficult in this area due to the inelasticity of surrounding epithelium. It is often necessary to use free skin grafts for temporary closure. Adequate compression dressings are important to prevent formation of a hematoma that will create an irregular lumpy scar in the forehead region.

Eyelid—Extravasation in an eyelid frequently poses the difficult problem of repairing a lid that is greatly swollen by the time the patient reaches the operating room (figure 2). One should, however, attempt primary closure with advancement of skin edges to the defect. One may correct a large avulsion of skin by means of an elliptic free skin graft from the opposite eyelid. Immediate tarsorrhaphy of the injured lid will protect both the ocular function and the repaired lid structure. Gauze eye pads can be used for dressings if caution is exercised to prevent excessive pressure.

Ears—Through-and-through lacerations of the ears are approximated, joining cartilage and skin individually. The edges of cartilage should be sutured to prevent later overlapping and resultant step-scar formation. Absolute hemostasis is required to prevent hematomas and the so-called cauliflower ear. Actual stellate defects in the ear structure are corrected by excising the defects in a V manner with primary closure. A smaller ear is less disfiguring than a large, scarred, punched-out region in the helix.

Nose—Fractures of the nasal bones should be elevated, realigned and held in position

FIGURE 4a. Laceration through nasal cartilages and septum. Automobile accident.

FIGURE 4b. Direct closure in separate layers using absorbable sutures in cartilage and fine nylon in nasal mucosa and skin.

FIGURE 5a *(left)*. Multiple fractures of nose and maxilla and complete severance of upper and lower lips. Patient was kicked by a horse.

FIGURE 5b *(right)*. Result of immediate repair in one procedure including elevation with direct wiring of maxilla, reduction of nasal fractures, and closure of laceration in layers.

with internal packs and an external nonyielding splint (figure 3). Repair of soft tissue may be accomplished by undermining of surrounding tissues and approximation. Exposed bony or cartilaginous areas may necessitate adjacent flaps and split-skin grafts for primary resurfacing (figure 4). At the time of initial repair, adequate coverage is more important than concern over the result. Later, secondary reconstruction utilizing composite cartilage, fat and full-thickness skin grafts from the ear will recreate the normal contours of the nasal alar regions.

Middle third of the face—Crushing injuries to the maxilla are not uncommon and frequently are associated with fractures of the nose (figure 5). Simple reduction through a Caldwell-Luc mucosal incision on the affected side, with elevation and digital molding of the walls of the maxilla into their normal position, handles this injury adequately. A pack of gauze dipped in balsam of Peru is threaded through a perforated Penrose drain and placed into the sinus for support. It is left for 10 to 14 days, during which time antibiotics are given to prevent infection. In a fracture of the zygomatic arch (figure 6), the direct Gilles temporal approach is utilized to reduce the fracture. Metal pins may be necessary for internal wire fixation. Direct wiring of bony fragments gives more complete immobilization and obviates the need for external fixation appliances.

Lips—Recent advances in surgical treatment of congenital cleft palate have contributed materially to our understanding of the principles of repair of traumatic injuries of the lips (figure 7). All closures should include separate approximation of the mucosal surface, muscle and skin in appropriate layers. It is particularly important in this area to prepare the wound carefully by removing all devitalized tissue. With appropriate cleansing technic and antibiotic therapy one can control infection and avoid the practice of leaving intra-oral wounds open for drainage. Due to the rapid absorption of catgut, one should use silk, cotton or other nonabsorbable sutures intra-orally.

There is one notable exception to primary surgical treatment of lip injuries, and that is an electric burn. Because of the excessive

FIGURE 6a *(left)*. Fractures of bones in middle third of the face resulting from injury while working in an oil field. Fractured maxilla involved depression of inferior orbital ridge; eye was displaced, creating diplopia.

FIGURE 6b *(right)*. Repair by reduction and elevation of fractures by intra-oral approach with packing of antrum to maintain position.

FIGURE 7a *(left)*. Multiple facial lacerations and nasal fracture with loss of tissue of central third of upper and lower lips. Windshield injury.

FIGURE 7b *(right)*. Primary repair by layer closure of all wounds and replacement of vermilion border with rotation pedicle flap from mucosal lining of oral cavity. Nasal fractures reduced simultaneously.

FIGURE 8a. Tissue loss on right lower side of chin. Human bite.

FIGURE 8b. One stage repair using rotation pedicle flap from neck.

cicatricial formation one should allow these wounds to heal by secondary intention and perform reconstructive surgical procedures.

Lower third of the face—Wounds over the anterior surface of the chin usually can be closed primarily. Because of its prominent position the chin receives more bizarre wounds than some other facial structures. Wide undermining of the margins of the defect with firm closure of the subcutaneous tissue will tend to flatten out the skin surface. Lacerations are best sutured along the normal lines of tension, utilizing Z-plastic incisions to change the directions of scarring when necessary (figure 8).

Summary

Surgical management of traumatic facial injuries demands meticulous attention to detail in order to prevent deformity. Such complications as hemorrhage, obstruction of the airway, shock, and damage to the central nervous system require prompt recognition and immediate care. Specific details of surgical management depend largely on the type and size of the wounds and the involvement of certain special structures. However, basic principles of technic are applicable, including proper cleansing, exploration for foreign matter, minimal debridement of devitalized tissue, avoidance of tension in suturing, simple methods of closure, proper fixation of fractures, and adequate over-all dressings. The good results achieved by adhering to the details of treatment justify the time and effort involved.

Diagnosis and Treatment of Vaginitis

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ALBERT C. LAMMERT

EVERY physician who treats gynecologic disease is familiar with the complaint of "abnormal vaginal discharge." A thorough investigation is important, for treatment should be directed to the specific cause. Patients frequently interpret an exaggerated physiologic discharge as abnormal, and inaccurate diagnosis may lead to inappropriate or psychologically traumatic treatment. Abel[1] stressed the importance of accurate microscopic diagnosis in order to fit treatment to the specific type of vaginitis.

Leukorrhea is defined as any abnormal vaginal discharge other than blood. Vaginitis, or inflammation of the vaginal mucosa, is only one of its many causes. Others such as carcinoma of the cervix, cervical polyps and cervicitis may be determined by inspection, Papanicolaou's smear and biopsy.

Vaginitis in one form or another can occur at any age. It can be conveniently classified according to three age groups: (1) prepuberal, (2) menstrual and (3) postmenopausal. This division is logical because in the three age groups the histologic structure of the vagina differs—a fact that should be borne in mind when evaluating cases and considering their treatment.

Prepuberal Vaginitis

In the newborn infant, the vaginal mucosa is temporarily of adult type, consisting of 40 to 50 layers of squamous cells, because before delivery it has been under the influence of the high estrogenic titer in the maternal blood. This estrogenic influence is withdrawn when the umbilical cord is clamped and cut, and in about one month the mucosa reverts to the juvenile type. Throughout childhood it is only a few cell layers thick and is delicate and susceptible to trauma and infection. A common

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source of trauma is introduction of a foreign body by the child. When vaginal bleeding occurs in this age group, the presence of a foreign body in the vagina should be suspected and ruled out. A rectal examination can be performed, but if it is inconclusive an examination should be performed under general anesthesia using a Kelly urethroscope in order to visualize the vagina directly.

It should be pointed out that what parents consider a profuse discharge may be a minimal local vulvitis amenable to good hygienic measures alone. In all cases, parents should be cautioned against contributing to a genital fixation on the part of the child by too frequent inspection and too much attention to that region.

The most common type of vaginal infection seen in private practice is a "mixed" one from which a variety of organisms can be cultured. This is to be expected, for self-manipulation with dirty hands carrying a variety of organisms is probably one of the main sources of infection. The diagnosis is established by excluding the presence of a foreign body and by culture of a mixed flora from the discharge. Treatment is with an antibiotic appropriate for the organisms cultured.

Gonorrheal vaginitis is not common but always must be considered. It is spread through contact with infected persons or objects, and for this reason more often is seen under conditions where groups of children live closely together. A profuse yellow discharge usually is present and there is often an associated vulvitis. The diagnosis can be established by demonstrating the typical gram-negative intracellular diplococci on a stained smear. Culture will yield a higher percentage of results that are positive.

Successful use of estrogen alone in treatment of this disease clearly demonstrates that it is a local disease that can be treated by building up the thickness of the vaginal mucous membrane. Diethylstilbestrol in doses of 0.5 mg. per day for about three weeks has been used. Other treatment employing a vaginal suppository containing 1000 I.U. of estrogen daily for the same length of time has given good results. Sulfonamide drugs formerly were used with fair results, but a three day course of penicillin in appropriate oral or intramuscular doses, depending on the age and weight of the child, has become the preferred method of treatment because the results are excellent. The patient may be considered cured after three negative smears or cultures have been obtained on three successive weeks.

Menstrual Vaginitis

The menstrual age group provides the largest number of cases of vaginitis, particularly during the reproductive years. Cases due to *Trichomonas vaginalis* and *Candida (Monilia) albicans* are the most common. Several reports of a third type, *Hemophilus* vaginitis, have appeared recently.[2,3] Mixed infection of a nonspecific type does occur, whereas chemical irritation is less frequent.

The vaginitis caused by the parasitic flagellate *T. vaginalis* is characterized by profuse yellow or white frothy leukorrhea. Burning, itching and vaginal irritation leading to dyspareunia are common complaints. The vaginal mucous membrane characteristically is reddened and presents a granular or so-called strawberry appearance. The diagnosis can be suspected by this condition but must be confirmed microscopically. To prepare a wet smear, a small amount of the discharge is mixed with a few drops of warm saline solution and a drop or two are placed on a glass slide. The organism is slightly larger than a white blood cell and is easily identified under the low or high dry power of the microscope by its great motility occasioned by its active flagellum. *T. vaginalis* organisms have many different sizes and shapes, the significance of which is not entirely clear. Cultures yield a slightly higher percentage of positive results in large series but for practical purposes seldom are necessary. It is said that possibly 25 per cent of all women harbor the *Trichomonas* organism, but only a relatively small number are symptomatic. There are emotional precipitating factors that may convert a dormant case to a symptomatic one. "Heavy petting," illicit intercourse and subsequent fear of venereal disease, and emotional crises are examples of possible precipitating causes.

Hundreds of medications have been used in treatment of this disease, indicating that there is no entirely satisfactory therapy. The usual approach is an attempt to eliminate the organism by local treatment. Perhaps the ultimate answer will be a systemic medication or a combination of systemic and local treatment. Recent attempts using this principle have not proved entirely satisfactory. Each of the standard methods of treatment seems to yield a high percentage of initially good results but in all reports a significant percentage of resistant cases is encountered.

Certain principles of treatment must be kept in mind regardless of the medication used.

1. Treatment should be carried out on a definite schedule and over a period long enough to be considered an adequate trial. This will vary according to the medication that is used.

2. Treatment must be continued during menstruation and for several days following menstruation because the presence of blood serum enhances growth of the organism.

3. Adequate follow-up is necessary until negative wet preparations are obtained or at least until the patient is asymptomatic and remains so despite the continued presence of the organism.

4. In recurrent or seemingly resistant cases, possible sources of reinfection must be sought and eradicated. Electrocauterization of cervical erosions, ectropion, and infected Skene's glands, and removal of cervical polyps or infected Bartholin's glands may be indicated occasionally; however, major surgical procedures are not.

5. The patient should be instructed in good hygienic practices especially in regard to toilet procedures to avoid possible rectal contamination of the vagina.

6. The married patient should refrain from intercourse or have her husband use a condom while she is under treatment. He should be investigated as a possible source of reinfection in recurrent cases.

7. When one method of treatment has had an adequate trial and has failed, it is necessary to change or combine medications.

Candidal (monilial) vaginitis is caused by the yeast *C. albicans* and is characterized by intense pruritus and thrushlike or "cottage cheese" patches on the reddened vulva and vaginal mucosa. It is said that 10 per cent of all nonpregnant women and as many as 30 per cent of pregnant women harbor this yeast. A small but significant portion of these manifest clinical symptoms. The condition is common among diabetic women because the increased glycogen content of the cells of the vaginal mucosa offers an excellent medium for growth. This is also true during pregnancy because a correlation exists between high levels of estrogen and high glycogenic content in vaginal secretions. Perhaps the most common cause of candidiasis today is antibiotic therapy. A sequela of a course of broad-spectrum antibiotic therapy is the elimination of much of the normal bacterial flora in the vagina, which permits overgrowth of the yeast. When the diagnosis of candidiasis is made in the absence of a history of previous antibiotic therapy, a urinalysis should be done to determine the presence or absence of sugar. If this result is inconclusive a fasting blood sugar or glucose tolerance test should be obtained to exclude a coexisting diabetes. The diagnosis is made on the gross appearance of the vagina and by wet preparation of the discharge. The presence of mycelian threads with budding elements is confirmatory. If any doubt exists, a culture is made using Sabouraud's agar.

Response to treatment usually is good. Initial cleansing and drying of the vagina and application of 1 per cent gentian violet to the mucosa can be done in the office. This is followed by home use of one of the vaginal jellies containing gentian violet. The jelly is inserted in the vagina with a syringe applicator twice each day for about two weeks. An additional amount can be used externally to control vulval irritation and pruritus. The nuisance of staining of clothing with the jelly has been eliminated to a great extent in some of the newer preparations. Adequate follow-up with consistently negative smears at monthly intervals for at least three months is important. Re-treatment may be necessary, especially in diabetic patients, in whom recurrences are common. Good control of the diabetes is

important for there is a correlation between poor control and recrudescence of vaginitis. Douching should be kept to a minimum during treatment and an alkaline solution should be used, since an acid medium enhances the growth of *Candida*.

Nystatin (MYCOSTATIN®), an antibiotic produced by the organism *Streptomyces noursei*, is effective against many yeasts and fungi including *C. albicans*. Treatment using both vaginal suppositories and oral tablets offers a new and promising approach to the problem.

Trichomoniasis and candidiasis may occur simultaneously, requiring specific treatment for each organism. Despite many claims, a really effective combination treatment is not available at present.

A large percentage of cases of vaginitis that were called "nonspecific" in the past probably were due to *H. vaginalis*. Leopold[2] first reported culturing an organism closely related to the *Hemophilus* group from the urine of men with prostatitis, and the same organism was cultured from the cervical mucus of women with cervicitis. Gardner and Dukes[3] cultured a gram-negative bacillus from a high percentage of cases that formerly would have been called nonspecific. The organism in these two independent studies apparently is the same, and according to Gardner and Dukes it fulfills Koch's postulates.

The symptoms are less marked than in other types of vaginitis, and seldom are more than moderate itching and burning. The leukorrhea resembles that of trichomoniasis but the discharge usually is gray in contrast to the yellow or white leukorrhea of trichomoniasis. There is a close correlation between the presence of *H. vaginalis* and epithelial cells with indefinite outlines and coarsely granular cytoplasm as seen on wet preparations. These have been labeled "clue cells" and are considered practically diagnostic though a similar cell occasionally is seen in vaginitis due to another cause. A Gram-stained smear of the discharge shows large numbers of the typical gram-negative pleomorphic bacilli. The organism can be cultured but not easily; the most satisfactory medium has been a modified form of Casman's blood agar.[4,5]

Treatment consists of local application of triple-sulfonamide vaginal cream with a syringe applicator twice daily for two weeks. Hexetidine (STERISIL®) applied in the same manner once daily at bedtime for two weeks has given good results.[6] The married patient's husband should be treated at the same time with one of the tetracyclines, 250 mg. every six hours for four days. This will eradicate any *H. vaginalis* in the male urethra.

There is no doubt that occasionally a mixed bacterial infection causes vaginitis, but specific organisms cause the vast majority of cases. Occasionally, vaginal irritation is caused by the ingredients or the extremely high temperature of a douche. Infrequently there are sensitivity reactions to a chemical ingredient of a contraceptive jelly or other vaginal medication. Treatment in these cases consists of recognizing the cause and terminating the medication.

Postmenopausal Vaginitis

The postmenopausal group of patients have a thin mucosa, again secondary to the decrease in estrogenic influence. The most characteristic type of vaginitis seen in this group is atrophic or so-called senile vaginitis. The mucosa is easily traumatized and is prone to infection. The usual symptoms are pruritus, burning and soreness. Ulceration can develop easily and the thin discharge that often is present may be tinged with blood. This should be borne in mind as a possible cause of postmenopausal bleeding, but its presence does not preclude the possibility of the simultaneous presence of uterine carcinoma.

As in prepuberal vaginitis where estrogenic influence is lacking and the mucosa is thin, the logical and most effective treatment is estrogen, either locally in suppository or syringe applicator form or systemically in doses of 0.5 mg. daily for two weeks. Too prolonged or vigorous therapy may stimulate the endometrium and lead to uterine bleeding. When bleeding occurs, treatment is the same as for any postmenopausal bleeding. A Papanicolaou smear is taken in the office, followed by dilatation and curettage and cervical biopsy in the hospital to exclude cervical or endometrial carci-

noma. Treatment at regular intervals, such as the use of vaginal cream or suppository for one week of each month, may be necessary to control symptoms.

All types of vaginitis are seen in this period of life. Feo[7] reported a large series of cases of postmenopausal trichomoniasis. Candidiasis and mixed infections also are common. Diagnosis and treatment are the same as previously outlined.

Summary

1. The most common types of vaginitis seen in the prepuberal, menstrual and postmenopausal age groups are discussed.

2. Vaginitis usually has a specific cause, and the treatment should be individualized accordingly.

3. Gross appearance of the vagina is diagnostically helpful but can be misleading. Microscopic examination of a wet preparation is necessary. When a wet preparation is inconclusive, a stained smear and a culture often are helpful.

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Postgraduate Clinical NOTES

92. OBSTETRICS IN HOSPITALS

The most important single administrative problem is whether the trend toward institutional and away from domiciliary confinement, which has been evident in the urban districts of this country, is to be fostered and encouraged to the point where nearly every woman will be delivered in an institution. This is what pertains in the United States, Australia, Canada and in many other countries. The available evidence proves conclusively that the safest place in which a mother may have her baby is in an institution adequately equipped and staffed to meet every emergency. The safety of the mother and child must be the prime consideration, even though economic and social factors obviously influence the speed with which any country can progress toward the ideal in organizing any medical service. In this particular case the social and domestic difficulties inherent in domiciliary midwifery are steadily increasing, so that pressure is being exerted, not only from the profession concerned primarily with providing the best service to the patient, but also from the patient herself, to increase the availability of institutional accommodation. The commonest reason today why a woman does not have her baby in the hospital is that no bed is available, and not that the patient or her attendants think it is better for her to have the baby at home. At the same time it should be explained that the place where the baby is born is not the only factor determining the outcome, because it so obviously must be influenced by the knowledge, skill and experience of the attendants, and also by the general physical health of the patient.

J. H. Peel, Advances in obstetrics and gynaecology, *Practitioner*, October 1957, p. 369

Evaluation of Intelligence in Children

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In the future, even greater emphasis will be placed on the evaluation of intelligence in children than has been in the past, owing to the fact that the cultivation and conservation of human resources is becoming a national problem. Therefore, concern is growing for searching out gifted individuals and for developing potential which ordinarily might be lost. Methods for evaluating intelligence consist of a variety of tests. Intelligence may be defined as ". . . the aggregate or global capacity of the individual to act purposefully, think rationally and to deal effectively with his environment."[1] This is only one of several definitions, but it serves as a statement of what tests for intelligence are attempting to measure. Such a definition is broad and inclusive, and no single test is likely to tap all facets. The various tests approach the measurement of intelligence in differing ways.

Several factors are involved. First, the effectiveness of the test depends on its internal structure. Since the capacities by which intelligent behavior is expressed are many, the more of these capacities that the test taps, the better. Among them are included verbal skills, memory, perception, visual motor coordination, reasoning, judgment—both practical and theoretical—number skills, the visualization of the relations of objects in space, and imagination. In testing these capacities, the problems to be solved must vary from very easy to very difficult so that all individuals of different levels of intelligence can perform enough to get a score. These variances of difficulty must fall along a scale of regular intervals so that performances can be compared.

Before any test can be used, however, standards, or norms, are needed in order to score any individual performance against what can be expected as average in the general popula-

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tion. This process is called standardization of the test, and, for the norms to be acceptable, the standardization must be accomplished according to careful sampling methods. Furthermore, the results obtained with a test must meet a requirement of consistency called the reliability of a test. It would be worthless if a test measured the intelligence of a person as deficient today and average tomorrow. In addition, the test must measure what it purports to measure, that is, it must have validity. How pointless an instrument would be if most of the children scoring at an average level with it are failing in school.

Like any test not administered in a series, the test for intelligence intends to obtain in a single sample a representation from a vast number of samples. It is important that the single sample of performance is a true microscopic picture. Each individual should perform as well as he is able. The administration of the test is an essential element. The instructions must be understood in order to obtain proper performance. Encouragement to perform is often necessary, but, of course, hints about answers are absolutely taboo. Yet, many a frightened child needs special consideration before the testing situation loses its threatening quality. Nevertheless, the examiner of one child, and all examiners, are trained to repeat the administration of any test in as close an approximation to a standard procedure as is possible.

In a one-to-one situation, that is, examiner with subject, it is possible to obtain a better result than when one examiner tests an entire group at once. Tests that are administered individually are therefore preferable to tests administered in a group. Such tests are both available. In schools, group tests often are used in order to get an estimate of the level of intelligence of the pupils. These tests are very efficient in that they cost little in time or training, but they are limited in the number of capacities tested. Whenever a particular problem exists, however, whether it consists of retardation, behavior problems or brain injury, individual tests should be used. If a report of intelligence is submitted in terms of test results without naming the test, it is well to determine whether a group or an individual test has been used and to give much greater credence to the latter.

The two most commonly used individual tests for intelligence of children are the Wechsler Intelligence Scale for Children,[2] or WISC, and the 1937 Revision of the Stanford Binet test.[3] They both meet the requirements of a "good test," and it takes from 30 to 90 minutes to administer either of them. They are not repeated at intervals of less than a year because of practice effects. That is, familiarity with the test and an opportunity to check on answers (although examiners do not tell whether answers are correct or incorrect) tend to raise the level of performance spuriously. All the more reason to make the single testing session provide representative results! The Binet test can be used for children aged two years and up, the WISC for school-age children and older children. In addition, briefer procedures designed for special purposes (e.g., detection of brain injury in the nondefective child) are available. Among these are the Bender gestalt test,[4] the Benton visual retention test[5] and the Goodenough draw-a-man test.[6] Tests adapted for children with special handicaps in hearing, speech, vision or motor coordination are also available.

The qualifications for giving and interpreting an examination for intelligence should be a graduate degree, M.A. or Ph.D., in psychology as an absolute minimum for proficiency. The examiner should have had a year's supervised experience or clinical internship. Most psychologists are associate members or fellows of the American Psychological Association. If he has a Ph.D. degree in clinical psychology, and both graduate education and clinical training have been obtained at institutions approved by the Education and Training Board of the A.P.A., and if he is a diplomate of the American Board of Examiners in Professional Psychology, he has achieved the ideal in training and experience. Qualifications needed for the use of the individual tests differ from those needed for the use of group tests given in schools. Usually, the WISC or Binet test is given in conjunction with other tests designed to furnish more information about specific

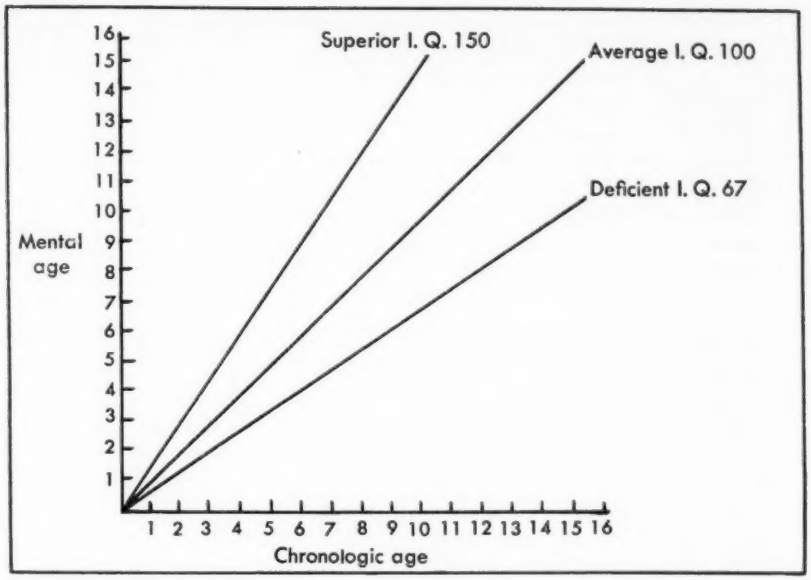

FIGURE 1. Mental age, chronologic age and intelligence quotient.

mental functions or about personality and behavior. The psychologist needs to know which tests to use for various problems and how to interrelate the findings of various tests. Generally, an assessment of intelligence is much more valuable in the context of other features of a child's life than it is as a straightforward statement of the intelligence quotient.

Results of an intelligence examination indicate the current level of a child's capacities and provide a basis of prediction for future performance. Prediction is possible because the test shows not only the level of mental development, or mental age (MA) as compared with chronologic age (CA) (MA divided by CA = I.Q.), but also shows the rate of mental growth of the child. Although both chronologic age and mental age increase (mental age to a point at around 15 years), the ratio between the two remains the same, and the I.Q. stays relatively constant, under normal conditions (figure 1).

As the ages increase, the I.Q. remains constant, but the deviations from the average become more marked. After the age of three years, mental growth becomes relatively stable so that it is possible to predict a child's capacities for the school years. Below the age of three years, the predictive power of tests decreases with younger ages, and infant tests should not be used for prediction except for very rough distinctions such as those between deficiency and superiority. Infant tests are often used in adoptive procedures to determine whether the infant to be adopted will develop to the mental level of the adoptive family. If the intelligence of the child does develop to such a level, it may be as much due to the environmental influence of growing up in the adoptive home as it is to inherited intelligence. The question of the origin of intelligence, whether by nature or nurture, has not been settled. It is safe to assume that both nature and nurture are crucial, and that it is possible to interfere with environment but not with heredity.

Both educational and vocational plans ought to take level of intelligence into consideration as, of course, they should also include interests, talents and motivation. It is possible to begin guiding the bright school-age child toward careers demanding education, leadership or creativity on the predictive value of an examination for intelligence. Excessive pres-

TABLE 1

CLASSIFICATION OF INTELLIGENCE

I.Q.	CLASSIFICATION	PER CENT INCLUDED
130 and higher	Very superior	2.2
120 to 129	Superior	6.7
110 to 119	Bright normal	16.1
90 to 109	Average	50.0
80 to 89	Dull normal	16.1
70 to 79	Borderline	6.7
69 and below	Mental defective	2.2

sure may make the child contrary, however, but a knowledge of his intelligence offers a source for decisions about what sort of stimulation and exposure the child needs. This is so for the dull as well as for the bright child. Many a borderline defective child, considered educable for the basic language and number skills and given adequate special education, can sustain himself and a family in adulthood without needing institutionalization.

A familiarity and comfortable dependency have developed around the I.Q., so that there are cases in which a problem is disposed of on the basis of a number obtained through a test for intelligence. When the disposition involves institutionalization, a very thorough study of the total situation is called for. Psychologists are becoming increasingly concerned with the frequent misuse of the I.Q., and a tendency is growing in the profession to substitute levels or ranges of intelligence for the report of a numerical I.Q., approximately as shown in table 1.[2]

The range of mental deficiency is separated into three groups. Patients whose intelligence quotient ranges from approximately 70 to 50 may be considered educable in that they can respond to special education and learn basic skills of numbers, reading and writing to varying degrees. Those at the levels from 30 to 50 are trainable and can learn to perform useful tasks, although they will not learn academic skills. For those at the levels below 30, custodial care seems advisable, but, when this is considered for patients above 30 years of age, other factors such as age, behavior, physical condition, family attitudes and availability of resources must be considered. Some borderline children need special education while others can use an adjusted program in a classroom of normal children, depending on such factors as mentioned. Children in the dull normal range can attend public schools but may need special assistance and can only rarely complete a normal high school curriculum. Those in the average range can be expected to manage high school with more or less difficulty, depending on where they are in the average range. Some children near the upper levels will attempt college work, and may succeed, along with those in the bright range. At the superior levels, enrichment is needed, and graduate and professional education is in order.

All these comments must be understood in a context of influences, some of them associated with the examination itself, but many of them factors independent of intelligence as such, but associated with its application. Speaking of schools, it is clearly foolish to assume that the degree of difficulty education poses for children is the same in all schools. Not only does it vary on the basis of curriculum differences and standards, but also on the general level of intelligence of the pupil population. Owing to differences such as these, including the competition afforded by other children, a child with average intelligence will get As in one school and Cs in another. Even shifts from one teacher to another may cause such variations. The meaning that education has for a child is usually engendered by parental attitudes and expectations, and these arise from socio-economic, cultural and personality variations. In the child, motivation, work habits and emotional attachment to learning are the results of parental attitudes. Together with the standards to which a child conforms in his peer culture, these factors affect the application and development of intelligence. In a home where reading is valued, intellectual stimulation is a pleasure, and school learning is not associated with punishment, a child's native endowment can flourish. On the other hand, there are families in which academic learning is regarded only as a necessity and other avenues are available for stimulation. High intelligence or intellect is frightening to some people. In such an atmosphere

one would not expect to find a bright child as readily as in another family.

A classification such as that offered above is rigid and arbitrary, the result of statistical scores. The group score is essentially a point central to which all the individual scores comprising the group revolve, some closer, some farther from the central score, which is the average or mean. A similar deviation occurs when tests are repeated, beyond the factor of training. Therefore, a child at the upper level of the mental defective range may score enough additional points for his I.Q. to fall in the borderline range on the next examination, even if another test is used which is unfamiliar to the child. The ranges overlap, and chance alone may be responsible for the level to which a child's I.Q. falls in some cases. It is always necessary to allow a possible deviation of 5 to 10 points on either side of a child's I.Q. to satisfy statistical deviations.

The statistical deviation is, however, the least of the factors that influence performance on any single test administration. Associated with and perhaps responsible for such deviations is the physical, mental and emotional condition of the child during the examination. This condition depends on the circumstances of the examination, the examiner and his approach, the impact of the test materials, the setting, including furniture, lights and privacy, and on the building, whether it is a hospital, school, penal institution or clinic. Children often are frightened or angry about the examination, because they are misinformed, anticipate punishment, or assume that failures are unacceptable. Everyone fails an intelligence test, because the test is made so that no one can pass all the items. In fact, the examination is terminated only after a specified number of failures have occurred. It is important that children have some conception that they will be examined for "some things they know and can do and that it will be like games." Fatigue, restlessness, hunger and poor physical condition, including colds, like the factors described above, can interfere in the child's test performance.

The inhibition of intelligence demonstrated by impaired performance is due to interference in various mental functions. It is difficult to concentrate when an obsessive concern dominates thought. A headache or cold does not enhance clarity of judgment. Emotional distress, shown by fear or anger, can cause utter lack of awareness of matters that, under conditions of tranquillity, would seem patently obvious. Nevertheless, at the prospect of an examination, most people experience some apprehension such as is often referred to as "butterflies." It is the examiner's task to evaluate the extent to which these influences impair performance on the test. Any report based on an examination for intelligence should include a discussion of the patient's behavior, attitudes, physical condition and other matters that may be relevant. In this way, the dangers inherent in an unreflective reliance on a numerical I.Q. are averted.

The psychologist's discussion of the findings of the examination is only begun with considerations of effects on the administration of the test. Since each test includes items designed for one or another mental function, comments on differential performance in various skills, faculties or capacities should be included. Although one child may have great difficulty with problems involving the use of language for their solution, he may have facility for solving problems by using objects, pictures or graphic methods. Whereas a patient has a clear-cut memory deficit, his judgment may be precise and clear. Usually children do about equally well with all types of tasks, but, when variations occur, significant information is revealed. For example, brain injury can impair certain memory functions; severe personality disturbance can produce faulty reasoning and an erratic quality in attention; or a special talent or skill may become apparent.

The child appearing for an examination reacts to the situation, has a set of attitudes about the examination and intelligence, and also brings long-term or permanent patterns of performance. Some of these depend on native endowment, others on environmental stimulation or training; still others represent secondary effects of emotional and physical states. Usually, children are examined psychologically because there is a need for assist-

ance in educational or vocational planning, or because a problem is felt to exist or has been demonstrated. In clinical practice, one is generally confronted with problems, and intelligence is often the area in which problems are apparent. If one assumes a broad definition of intelligence, the behavior of the child is the index for problems to the adults around him, whether they are parents, teachers or others. Unintelligent behavior can arise from a multitude of causes, but only a small portion of it arises from limited endowment. For everyone of dull normal intelligence or better, behavior, emotion and intelligence, whether expressed in fantasy or communication, are inextricably intertwined. Everyone behaves unintelligently at times, no matter how brilliant the intellect. If all are born equal, all are equal in that some stupidity is shared, and everyone errs.

The quality of intelligence is inherent in many areas of experience and is subject to deviation. In psychoses, delusions and other disturbances of thinking are pathognomonic. Children with antisocial bents often refuse to perform intelligently in defiance of authority. Some children are so frightened they are unable to communicate, and may be mute. Motor, vision, hearing and speech deficits of local or neurologic origin have direct bearing on intelligence and have been misinterpreted as mental deficiency. Similarly, disturbed children of average intelligence may be so confused or unmotivated that they seem deficient. Brain injury, traumatic or infectious, can induce hyperactivity and distractibility as well as specific dysfunctions, forcing the level of intelligence down. Often children with infectious encephalitis improve markedly after recuperation from the infection, and may have no permanent loss. Some children fear learning because they consider their interests bad or expect to discover something dangerous. This often involves a childhood neurosis. Occasionally, children of superior intelligence, if bored in school or ridiculed by friends or family, assume behavioral disturbance. Similarly, borderline or defective children, aware of their limitations compared to others, may become distressed. There is no need to assume that a retarded child is automatically also an unhappy child. For him, as for others, there is a reason, and he can be helped.

Intelligence is integral to everyday life most prominently in child rearing, both in the child's development and in the parents' handling. The earliest manifestations of intelligence in the infant are observed in motor development, motor coordination and social response. Subsequent to this, language skills appear, communication becomes refined and socialization processes, such as toilet training, eating habits and conformity to regulations, emphasize parents' educational functions. Concurrently, in the preschool years, all the various mental capacities mentioned are more sharply and subtly defined. A fairly orderly sequence is apparent in the development of intelligence. Many parents are unaware of the fact that childish behavior is often the product of the child's limited intelligence. They may be equally unaware of the fact that mental growth will occur naturally. Severe acute or chronic disturbance can affect it adversely, but this can be safely considered pathologic.

An additional complication arises from the child's impulsive emotionality. It is often difficult to determine whether the child's behavior is the result of emotion or limited understanding. Therefore, parents may react to the child emotionally, assuming that it is stubbornness, for example, and not the lack of comprehension or capacity that induces the child's behavior. In any case, many parents find children's behavior unpredictable, disruptive and unrealistic (as it often is). This easily stimulates an emotional rather than a reasoned response in parents. Understanding of the mental and emotional life of children can enhance parents' capacity to handle children intelligently. Nevertheless, nonintellectual factors play the major role in parent-child relations. Value judgments, attitudes, emotions and goals are the foundations of family life. Sometimes very intelligent people get along poorly with others and have serious problems with their children.

When parents are faced with mental retardation in a child, attitudes and emotions may determine the reaction to this diagnosis. Often, parents have already developed pat-

terns of attitudes and management for the retarded child before a specific diagnosis has been made. This is possible because parents perceive the differences between retarded and average children. In informing parents of mental retardation, both the reaction to the information and prior patterns about it should be considered.

Just as parents can estimate a child's mental capacities, so can a physician. People always make rough appraisals of intelligence in others, using informal, occasionally unconscious and sometimes erroneous standards. However, it is possible to make a roughly accurate assessment of a child's intelligence from sources other than an intelligence test. In the infancy years, motor, sensory and social development is used. Once interpersonal and communication skills appear, aspects of training and use of language are helpful. These developments appear roughly at chronologic age sequences. Very useful at all ages are the spontaneous vocabulary of the child, his ability to be attentive, and his over-all alertness. Such information is available both from direct observation and from reports by parents. In the school years, achievement in school work is approximately correlated with level of intelligence. Reports of teachers' observations can be helpful, and close contact between the physician and the school can offer assistance in both diagnosis and disposition if the child's problem involves his intelligence and behavior. A two year old child is naturally disoriented. As children become older, less allowance is made for their confusion, disorientation and faulty perception and logic. Such disturbances in thinking reflect disturbance of the total personality, as they do in adults. When several rough indexes of intelligence fail to support one another in an estimate of intelligence, when a single mental capacity is impaired, when the general level is low, when disturbance in thought occurs, when achievement is not compatible with observed intelligence, or when purely behavior and mood symptoms exist, referral for a psychologic examination, including a test of intelligence, is appropriate.

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Neoplasia of the Thyroid

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NEOPLASIA of the thyroid is a subject in which every physician should be interested. This includes pediatricians, and one might say it applies particularly to pediatricians.

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Through the courtesy of Dr. Warren Cole of the University of Illinois and two of his associates, Dr. Marshall and Dr. Majarakis, we have two patients to present.

DR. MARSHALL: Mrs. D. is 69 years of age. She first consulted her family physician in July 1957 because of weakness, upper abdominal pains, and weight loss. She had lost 19 lb. in the previous year. Careful physical examination revealed a hard, smooth mass in the area of the left lobe of the thyroid gland. It measured approximately 2 cm. in either diameter and moved when the patient swallowed. Mrs. D. had been unaware of the mass and did not know how long it had been present. Other masses in the thyroid or neck were not noted. She said she had noticed occasional sticking of food in her throat for some time, but there was no evidence of nervousness, decreased tolerance for heat, or tremor. The weakness and fatigue were felt to be due to anemia (hematocrit reading, 32) secondary to a gastric ulcer and melena. Laboratory findings were normal. X-rays of the neck revealed some question of calcification in the area of the thyroid mass.

DR. OCHSNER: This lady does not appear abnormal. I examined her previously, and there is a nodule in the left lateral lobe of the thyroid gland which one can feel quite readily by shoving the thyroid over to the left side and getting the fingers behind the sternocleidomastoid muscle. This is the best way to palpate the thyroid, because you can palpate it throughout its entirety.

This patient has few symptoms and a solitary nodule in one lobe of the thyroid. May we have the next patient, please?

DR. MAJARAKIS: This patient, a 49 year old woman, came 60 miles to be here. She is typical of most of our patients at the University of Illinois Tumor Clinic; we see most patients throughout the state. We had followed her in the clinic because of fibrocystic disease of the

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breast until finally we biopsied a nodule and confirmed our preoperative diagnosis of fibrocystic disease. Four months ago one of our junior students, while examining the patient, slipped his hands up into the neck and found a mass there. Subsequently we found a basal metabolic rate of 2+ and an uptake of I^{131} of 33.8 per cent, and no other positive laboratory findings. The patient has complained of some nervousness. She is now conscious of the enlargement in her neck. She is complaining of perspiration and symptoms suggesting the menopause, and she is having some menstrual irregularity. We are planning to explore the patient's neck.

DR. OCHSNER: This is very much the same situation as in the first case. The only difference is that the nodule is in the right lateral lobe of the thyroid rather than the left. One examines the right lateral lobe the same way. Using the thumb of the opposite hand, one pushes the larynx over toward the side to be examined. By getting the fingers behind the sternocleidomastoid muscle and the thumb in front, one can palpate a nodule about 4 cm. in diameter, which is quite spherical and freely movable.

Both patients represent a problem many of us face. What should we do about it? Is it of any significance?

Dr. Majarakis is going to tell us about another patient, who unfortunately cannot be presented, but we have the advantage of a follow-up operative report.

DR. MAJARAKIS: A 36 year old white woman, a dentist's wife, came to our clinic in July 1957. She had a mass in the thyroid region of about 19 months' duration. It was enlarging progressively but had not caused symptoms. She decided to have something done about it because of some masses noted behind this mass in the neck in the anterior cervical region, these having been present for about two months. She had lost 20 lb., probably more because of concern and anxiety than because of the primary disease. Preoperative studies all gave essentially normal findings. Operation was done in July 1957. A frozen section revealed papillary adenocarcinoma with positive metastases on the right side. Since nodes were palpable high on the left side, we biopsied these at the same time and found some tumor cells. Consequently the procedure that is currently preferred in such cases at the University of Illinois was performed, which is radical neck dissection. By radical I mean that one removes everything except the skin—total thyroidectomy and, in this case, supra-omohyoid neck dissection. The diagnosis, as I said, was papillary adenocarcinoma along with accompanying extension. Because of the nature of the operative procedure, partly, and as one of the complications that we see occasionally, a temporary hypoparathyroidism developed. We were able to control it, and by the time she left the hospital it was controlled without medication.

DR. OCHSNER: I know of no more controversial question at present than that of carcinoma of the thyroid. There probably are several reasons for this. One is that papillary carcinomas of the thyroid are "relatively benign." By that I mean that they metastasize, and do so early, but the metastases are limited to the cervical nodes for relatively long periods. Dr. Majarakis told me that at the University of Illinois there are lymph node metastases in 85 per cent of the cases of papillary carcinoma. In our cases the incidence is about 50 per cent, but these tumors remain localized in the regional lymph nodes for a long period. It is for this reason that many physicians have said that one can treat these patients conservatively and need not treat them radically. There are some who would even have us believe that one need do nothing except pick out the nodules. On the other hand, there are patients who have the type of carcinoma of the thyroid described by Allen Graham as angio-invasive. These tumors appear benign histologically but invade the blood vessels and metastasize distantly, and were spoken of previously as benign metastasizing thyroids. Well, of course, a lesion that metastasizes cannot be benign; it is malignant, and it kills.

The type of tumor that Dr. Majarakis described in the third case was previously called aberrant thyroid of the neck. These are not aberrant thyroids of the neck; they are metastases from a thyroid carcinoma.

One cannot be complacent in the treatment of thyroid nodules. They are always potential hazards. Obviously, palpating the neck does not tell us what the lesion is.

Physicians have been in the habit of speaking of thyroid nodules as adenomatous goiters. An adenoma is a true benign neoplasm. For every nodule that is a true neoplasm there are many that are not neoplastic; they are involutional nodules.

In areas of the United States where goiter is endemic, nodular goiter is common. Most of these goiters are non-neoplastic nodules. Unfortunately it is impossible to say whether or not a nodule is neoplastic before it has been removed and subjected to histologic section. I do not believe the non-neoplastic nodule has any relationship to malignant change. I do believe, however, that the benign neoplasm, the adenoma, is a premalignant lesion and that we can accomplish a great deal prophylactically by removing these nodules of the thyroid. If we remove those that prove to be true adenomas, true neoplasia, before malignant change has taken place, we will have prevented cancer.

As illustrated by the third case described, when we find a papillary carcinoma of the thyroid with metastases to the regional lymph nodes, it is our policy to do not only a radical resection of the gland on that side, including the isthmus, but also an en bloc dissection of the neck.

In a group of 376 cases of nodular goiter, we found that 45 per cent were simple fetal or embryonal adenomas—not carcinoma, but potential carcinoma; 3.7 per cent were papillary cystadenomas, and 2.1 per cent were Hürthle cell adenomas. The incidence of carcinoma in our series of 1,355 cases of nodular goiter was 6.4 per cent. We studied this series in two groups. From 1942 to 1949 the incidence was 8.8 per cent, whereas in the more recent group it was 4.9 per cent. Why, I don't know.

It is rather interesting that in the earlier group we found a higher incidence of carcinoma in the solitary nodules, and in the more recent group we found a higher incidence in the multiple nodules. In the more recent group, in which the over-all incidence of carcinoma was 4.9 per cent, the incidence in the solitary nodules was 3.9 per cent and that in the multiple nodules was 6.2 per cent. The statement has been made frequently that the incidence of carcinoma is higher in solitary nodules than in multiple nodules. In our experience, at present it is higher in multiple nodules than in solitary nodules. Hayes Martin is, I believe, the only other investigator in the United States whose experience is the same as ours at present.

In 37 cases of proved carcinoma, papillary carcinoma fortunately occurred in more than half. I say fortunately because these offer by far the best prognosis. The patient whom Dr. Majarakis described was "fortunate" in that she had a papillary carcinoma. She is going to be well, I believe. She was treated adequately and correctly. However, one cannot be complacent about treatment of papillary carcinoma. The fact that these patients may live 10 or 15 years with metastases in the lymph nodes and limited to the lymph nodes does not mean that they are not going to die subsequently of carcinoma. They do die of papillary carcinoma unless it is removed completely. In our series, 35 per cent of the patients had metastases. The incidence of metastases in the papillary carcinomas was 45 per cent, and in the solitary adenocarcinomas it was 43 per cent.

As to symptoms, a nodule was present in almost 60 per cent of cases. Weight loss not due to toxicity was noted in 21 per cent, dyspnea in 18 per cent, hoarseness (a bad sign because it usually means involvement of the recurrent pharyngeal nerve) in 16 per cent, symptoms of pressure in 10 per cent, dysphagia in 10 per cent, rapid increase in size of the nodule in 8 per cent, anorexia in 8 per cent, pain in 5.6 per cent, and toxicity in 5.6 per cent. I call attention to the fact that only 5.6 per cent of the patients had toxic manifestations. Generally, evidence of toxicity lessens the likelihood that the lesion is malignant, but it does not give any assurance that it is not malignant.

Forty-three per cent of our patients felt the thyroid mass themselves. The mass was visible to 27 per cent of the patients. Sixteen per cent had symptoms but were unaware of the mass, and more than one-fourth of the group were

unaware that anything was wrong until a physician discovered a nodule.

The masses were described clinically as soft in 2.8 per cent, firm in 55 per cent, and hard in 38.8 per cent.

The interval between the first symptom and the institution of therapy is important. This information was obtainable in 32 of the 37 cases of proved carcinoma. The longest delay was 360 months, the mean was 33.6 months, and the median was 4.5 months. In 11 cases or 34 per cent there was no delay; the patient consulted the physician as soon as the mass was found. In almost 60 per cent the interval was less than six months, and in 28 per cent it was more than two years. In the case presented by Dr. Majarakis, approximately two years elapsed between the appearance of the nodule and treatment. I think it is because of that delay that the patient had bilateral metastases. If operation had been performed when she first noticed the nodule, she might have gotten by with a unilateral lymph node dissection, instead of a bilateral lymph node dissection.

I would like to call attention to a sign that Oliver Cope of Boston has described, the so-called delphian node. Located anterior to the trachea, frequently above or below the thyroid isthmus, is a lymph node that is so small that normally one cannot palpate it. In carcinoma of the thyroid, this node may be involved and it is readily felt because of its superficial location. Whenever one feels a hard nodule which is freely movable and anterior to the trachea, either above or below the thyroid isthmus, in a person who has a nodule in the thyroid, it is pretty likely to be a carcinoma. The younger the patient with a nodule in the thyroid, the more likely it is to be neoplastic. The older the patient, probably the less likely it is to be neoplastic. However, one is never justified in saying that a thyroid nodule is not neoplastic until it has been removed and examined histologically.

One of the 37 cases was diagnosed at autopsy. Of the 36 in which the diagnosis was made clinically, the lesion was diagnosed as benign in 57 per cent and considered malignant in 43 per cent. In other words, in more than half the cases we thought the lesion was benign before operation.

At the time of operation, the surgeon thought the lesion was benign in 42 per cent and malignant in 51 per cent. In 5.7 per cent he made the statement, "I don't know; we will have to wait for the microscopic examination."

Is frozen section of value? A good deal of controversy surrounds this question at present. We think it is of value. We think that in most instances a pathologist accustomed to studying frozen sections can determine whether or not a lesion is malignant. If there is any question, the surgeon must not, of course, do anything in a radical way until the results of study of the section have been reported, and then I would have no hesitation in going back and doing the radical procedure. On the other hand, if the pathologist can say without any question or doubt that the lesion is malignant, I think one should go ahead and do the radical procedure at the time of the original operation.

What should we do in cases of nodules in the thyroid gland? I think the most important method of treatment of cancer of the thyroid is prophylaxis. That consists of removal of all thyroid nodules unless there is good evidence of previous activity. A patient who has had toxic manifestations and in whom a thyroid nodule develops has a very good chance that the nodule is an involutional one. As the thyroid gland undergoes involutional change, it assumes a nodularity it did not have before. But generally one is not safe in ruling out malignant disease until the nodule is removed. This is especially true in young persons, as I mentioned previously, and particularly in men, because nodules in men are much more likely to be neoplastic than they are in women.

Curative treatment of papillary lesions depends on the type of lesion. Papillary lesions fortunately are the most common form of thyroid cancer. I say "fortunately" because they are the most amenable to therapy and we can secure the greatest number of cures.

Many times in these cases one cannot find a nodule in the thyroid. The patient has nodules in the lateral aspect of the neck, the so-called aberrant thyroids. We know now that they are not aberrant thyroids, but are meta-

static lesions in the lymph nodes. One should do an en bloc dissection on the involved side, remove the entire lobe of the thyroid on that side and remove the entire isthmus, and do an en bloc dissection of the neck. In regard to the opposite lobe, I think a partial resection is all that is necessary.

Some patients will have contralateral spread, particularly to the opposite lymph nodes; however, this occurs much less frequently if one performs the radical operation early. Frequently it is necessary to do an anterior mediastinal dissection. These nodes do extend down, from the mastoid process down to the suprasternal notch, and if the nodes in the suprasternal notch are involved one must dissect down into the mediastinum.

Whether or not the radical operation should be followed by x-ray therapy is a controversial question. I do not think x-ray therapy is necessary in all instances, but this is one of the situations where one might combine radical operation and x-ray treatment. For neoplastic disease in general, I feel there are certain cases in which it apparently does not make much difference which of the two modalities of therapy is employed. There are many lesions (cancer of the lip, for example) in which it does not make much difference whether one treats the disease surgically or with irradiation, but either modality should be employed to its complete extent. We should not use one incompletely and then rely on the other as a crutch. One should choose the modality he is going to use and use that alone. Cancer of the thyroid, however, is one instance where one might follow radical extirpation by irradiation.

Alveolar carcinoma is associated with a greater malignant potentiality, and one must do total thyroidectomy. Dissection of lymph nodes should be done, but frequently it is of no avail, because these lesions are the ones that metastasize beyond the neck. Distant metastases are common, and these should be irradiated.

Solid adenocarcinomas also carry a poor prognosis. Total thyroidectomy and radical neck dissection, frequently bilateral, are required, followed by irradiation.

Finally, there is the problem of palliative therapy for the patient who is strangling. As tracheal compression is present, one is justified in operating simply to relieve the strangulation. External irradiation is employed to destroy completely what function there is in the thyroid, and this is followed by administration of I^{131}. Unless the tumor takes up the I^{131}—unless it is a functioning thyroid—this substance does no good, and many of these patients do require tracheotomy.

In conclusion, I should like to make a plea to practicing physicians not to consider nodules in the thyroid gland as insignificant. Most thyroid nodules will be benign lesions, simple involutional nodules. Some, fortunately, will be benign neoplasia, adenomas. These benign neoplasms are potentially malignant, and some will have undergone malignant change already. Only by removing the benign lesion can one prevent the development of thyroid cancer, and only by removing the malignant nodule can one be aware that the lesion is malignant and know what type of therapy to use.

When you do find carcinoma of the thyroid, do not be complacent, but do a good cancer operation. Remove the viscus involved, which is the thyroid, and do an en bloc dissection of the neck.

DIAGNOSTIC CLINIC

Late Postoperative Problems Following Radical Surgery of the Stomach and Pancreas

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THE safety of modern surgery has greatly increased the number of patients having extensive resections of the gastrointestinal tract in an effort to be rid of malignancy or an incapacitating benign disorder. While the immediate morbidity and mortality rates have been reduced to an acceptable level, the late postoperative problems all too frequently prevent the full rehabilitation of the patient. This is especially true for those patients who undergo operations to remove all or almost all of the stomach or pancreas. The effective long-term treatment of these patients requires familiarity with the alterations in food acceptance and knowledge of how the adverse changes in the absorption of carbohydrate, protein, fats and iron can be corrected. As much responsibility is required in regard to rehabilitating patients having radical surgery of the stomach or pancreas as to providing the amputee with a satisfactory artificial extremity.

ROBERT M. ZOLLINGER

There is no doubt that the most frequent problem cases in this group involve patients who have had operations for benign duodenal or gastric ulcer. While removal of all or almost all of the stomach is mandatory in many cases of proved malignancy, there is less and less evidence to support the radical approach for benign lesions. This is an especially important preoperative consideration in underweight patients as well as in individuals with "birdlike" appetites. Radical resections of three-quarters or more of the stomach in

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TABLE 1

EVALUATION OF POSTOPERATIVE NUTRITIONAL PROBLEMS

1. Document type and extent of diagnosis and surgery
2. Possible recurrence of disease
3. Previous and present diet with weight trend
4. Efficacy of replacement therapy
5. Psychogenic vs. physiologic difficulty

such patients may lead to late postoperative problems which might well have been avoided by a more conservative procedure. Prevention still remains the best treatment insofar as the benign lesions are concerned.

Regardless of how busy the physician may be when he is confronted with a patient in difficulty after a radical operation on the stomach or pancreas, he must take the time to document the type of surgical procedure which was carried out, as well as the final diagnosis (table 1). This may involve considerable correspondence, as well as telephone calls in some instances, but effective treatment can only be based on thorough familiarity with the patient's original problem. Unfortunately no gastric operation has been perfected which is 100 per cent effective in preventing an occasional recurrent benign ulceration. Furthermore, technical mistakes must be considered, such as incomplete vagotomy, inadequate resection, long-loop anastomosis and improperly placed or too large a gastrojejunal stoma, to mention a few. Since 15 per cent or less of patients with gastric malignancy survive the operation for five years or longer, it is important to be informed as to whether or not a malignant lesion was found. Regardless of the diagnosis stated by the patient, it is essential to confirm or deny impressions from an authoritative medical source, for obvious reasons. Although a recurrence of the carcinoma may appear to be obvious, as a rule there are enough exceptions to warrant a thorough evaluation of each patient, since re-exploration may demonstrate a benign lesion. A case will be presented in which surgery was required on two occasions over a 12 year postoperative period following a resection of carcinoma of the ampulla of Vater.

All too frequently insufficient attention is paid to the patient's diet and weight trend. This is a common fault which must be corrected as more and more patients survive the extensive surgical procedures for malignancy. Diet must receive the same care, understanding and written instructions as would be given when prescribing a potent medication for a seriously ill patient. The family as well as the patient usually benefits from written instructions regarding feeding a particular problem patient. The various appetite stimulants, vitamins, etc. may be given, but, in addition, consideration must be given to the problem of decreased efficiency in the absorption of iron, sugars, fats and proteins. A decreased gastric capacity with subsequent decreased caloric intake may explain the patient's loss of weight. On the other hand, a disagreeable reaction to the ingestion of sweets or milk combined with a decreased fat absorption may add up to difficulty which requires definite replacement therapy such as pancreatic enzymes.

In addition to the changes which result from the patient's altered physiology of the upper gastrointestinal tract, attention must be given to possible psychogenic disturbances. A patient who has had a total gastrectomy, for example, may become quite elated at first by the attention he receives as a medical curiosity, but before long he may become acutely depressed at the gloomy prospect of trying to survive without a stomach. Also, the family may further contribute to the patient's difficulty by rigid adherence to "baby foods," without relaxing the restrictions to let the patient select by "trial and error." Seasoned foods, as well as alcoholic beverages in moderation, may prove quite effective in the return to normal rehabilitation in such problem cases.

Some patients fail to respond to the usual measures and continue to complain rather bitterly of disagreeable symptoms after meals. This phenomenon, given the bizarre name of the "dumping syndrome," is more prevalent after breakfast, most marked after the ingestion of hypertonic solutions, especially glucose, and tends to decrease in severity within a year after operation. However, this is not invariably true, and some patients limit their caloric

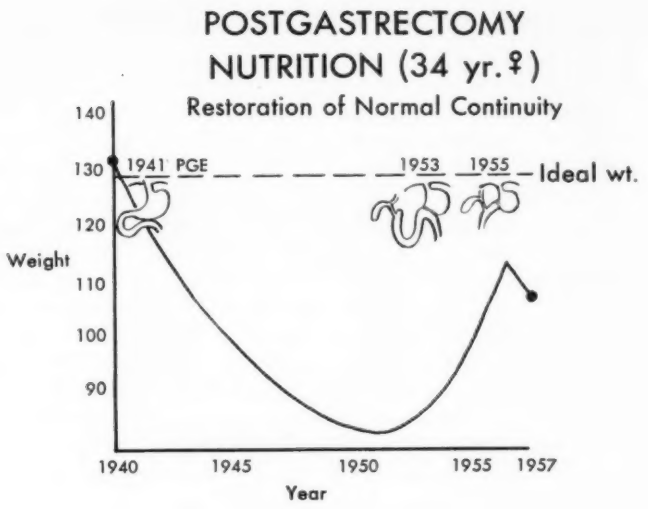

FIGURE 1. Closure of a gastrojejunostomy stoma with restoration of continuity through the duodenum should be considered in problem cases.

intake rather drastically by religiously avoiding sweets in order to remain reasonably symptom-free. Whether these postgastrectomy complaints are real or imaginary can be decided by making a study of the plasma volume difficulty that follows the oral administration of 75 gm. of glucose.[1,2] Serial blood volume determinations utilizing radioactive methods and taken every 10 minutes over a period of 60 to 70 minutes will tend to show a rather marked deficit within 20 minutes in many symptomatic patients. It has been generally supposed that the deficit has been lost into the upper small intestine to counteract the hypertonic glucose solution. This problem is being constantly investigated in many clinics. In general, we have tended to believe that a plasma volume deficit which exceeds 10 per cent of the patient's calculated normal is consistent with the complaints of "dumping." Unfortunately the situation resists correction, even though sweets can be avoided. Such patients should perhaps reverse the order of the traditional American breakfast by starting with bacon and eggs or buttered toast and ending with a sweet juice or cereal. In addition to

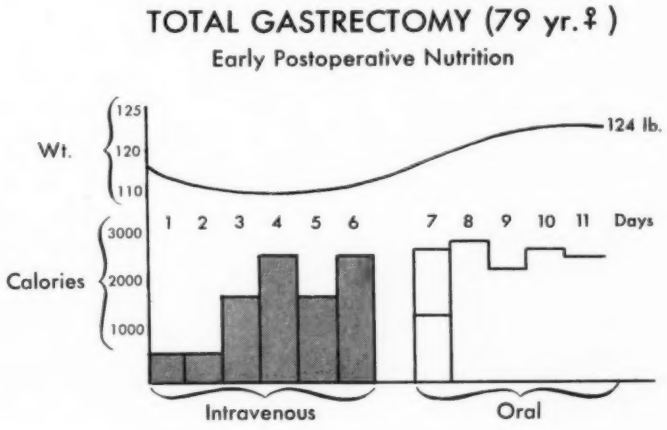

FIGURE 2. An adequate caloric intake in the immediate postoperative period is essential following total gastrectomy.

sweets, the postresection patient tends to lose his appetite for milk for some unexplainable reason. Such idiosyncrasies must be ferreted out and attempts made to provide a sufficient caloric intake without upsetting the patient's appetite or desires.

In rare instances the dumping syndrome may be so marked and resistant to therapy that the possibility of restoring the patient's gastrointestinal tract to normal should be considered. It must be admitted that in a few cases these difficulties will be so marked, even after gastroenterostomy, that closure of the stoma may be worthwhile. In addition, following a Billroth II type of radical resection, where the jejunum has been anastomosed to the stomach and the duodenal stump closed, the possibility of taking down the gastrojejunostomy and anastomosing the duodenum to the gastric pouch according to the Billroth I method has been rather widely accepted (figure 1). In our experience this procedure is very rarely indicated, although many favorable results, especially from Scandinavia, have been recorded.[3] We have had no experience with the long-term effect of interposing segments of jejunum or large intestine to bridge the gap between the gastric pouch and duodenum in order to decrease the amount of postoperative symptoms and increase the patient's postoperative nutritional status. So far, we have not been sufficiently convinced that these procedures have sufficient merit to warrant their routine application. Certainly with adequate mobilization of the spleen and gastric pouch as well as the C loop of the duodenum, the surgeon is usually able to effect a gastrojejunal anastomosis without difficulty. Indeed, in some instances, it is possible to anastomose the duodenum directly to the esophagus following total gastrectomy.

In order to keep the late nutritional problems to a minimum, it is important that the nutrition of patients having total gastrectomies, especially for malignancy, be sustained in the early postoperative period (figure 2). The improvement in intravenous solutions rich in calories has made it possible to supply patients today with as much as 2400 calories (3 l.) during the early postoperative period. It is usually necessary to maintain the intravenous feeding for approximately a week, following which time semisolid food can be given. We have offered such patients an ounce of spiritus frumenti several times a day in addition to the regular oral diet. Alcohol not only supplies calories but also provides the patient with a feeling of well-being; at the same time it perhaps decreases the feeling of discomfort that these patients may have following a meal, during the early phases of their postoperative period. Preliminary studies, however, have failed to show any beneficial effect of alcohol in preventing the shift in plasma volume which follows the oral ingestion of glucose.

There are several intravenous solutions which can be utilized to supply approximately 300 calories per liter. These preparations vary in their content of sugar, protein hydrolysate as well as ethyl alcohol. They are usually well tolerated but should be given slowly. Ordinarily, we have tended to give no more than 2 l. of these solutions a day, one of which may be given, at least in part, while the patient is sitting up in a chair. The age and mental status of the patient should perhaps influence the clinician in selecting the preparation with the lowest concentration of alcohol, since very elderly ambulatory patients may get into difficulty or may be confused if the higher concentrations of alcohol are used.

Intravenously administered fat preparations are being successfully used experimentally; however, they are not as yet available on the market. The preparations available to us contain approximately 15 per cent of fat as well as 5 per cent sugar. Six hundred cubic centimeters of such a preparation has provided approximately 900 calories. In general, fat preparations are contraindicated if the patient is receiving anticoagulant therapy or if there is evidence of liver disease. Of course, should a reaction develop in the patient, as shown by nausea or vomiting, fever, chest pain, dyspnea, etc., administration of the solution should be discontinued. It is hoped that these preparations which are rich in calories and relatively low in volume will become more and more available. They are needed in the early postoperative period for patients having radical

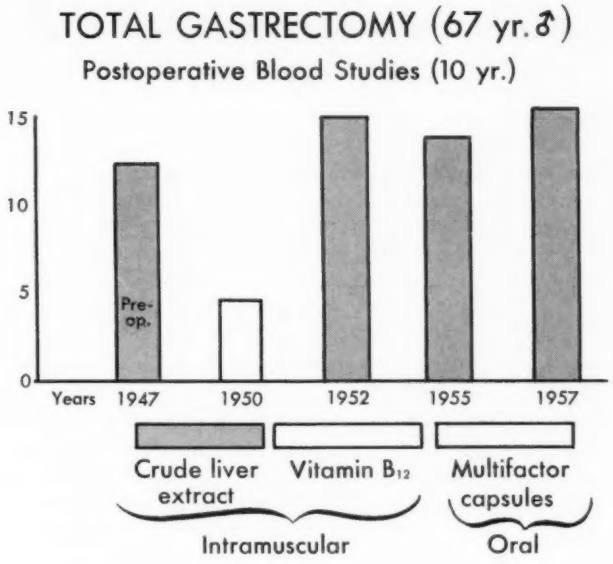

FIGURE 3. Efficient antianemia therapy must be continued following total gastrectomy.

surgery of the upper gastrointestinal tract or to supplement the patients' decreased caloric intake until their weight trend has stabilized or has increased to a level which is considered satisfactory.

Although the patient's weight may be sustained by heroic effort following total gastrectomy, there is usually a downward trend as soon as the patient returns home. This may be due in part to lack of appetite on the part of the patient, or to fear on the part of the family cook, who alters the diet in trying to make it acceptable to the patient. Such patients must be able to eat several thousand calories a day or their weight will steadily decline. Any illness or discomfort which decreases their appetite appears to have an exaggerated effect on the patients' weight. This is one of the reasons for scheduling the patient having radical surgery on the stomach or pancreas for readmission into the hospital within three weeks after discharge. It is very worthwhile to have other admissions follow at the end of six weeks, three months, six months, and at longer intervals depending on how well the patient is progressing.

In addition to his decreased caloric intake due to the lack of a gastric reservoir, the patient may be unable to eat because of gradual stenosis at the point of the esophageal anastomosis. If this occurs, the patient experiences progressive difficulty in swallowing which may be accompanied by substernal discomfort. Rather than accept the difficulty as recurrent carcinoma, the patient should be given a barium study to confirm the diagnosis, followed by an esophagoscopic examination. In the absence of evidence of recurrent malignancy, the area of stenosis can be stretched by the gentle passage of graduated dilators. Such aggressive treatment is especially important if the surgical procedure was performed for a benign lesion.

One of the few indications for resecting the entire stomach for a benign lesion is the presence of ulcerogenic tumors of the pancreas, since these tumors often tend to stimulate the fundic glands to overproduce gastric juice as long as any gastric tissue remains.[4] Under these circumstances the entire stomach should be removed, since this procedure is better tolerated than removal of the entire pancreas. Another reason for removing the stomach is an ulcer high on the lesser curvature adjacent to the esophagus which was believed, but unconfirmed, to be malignant at the time of

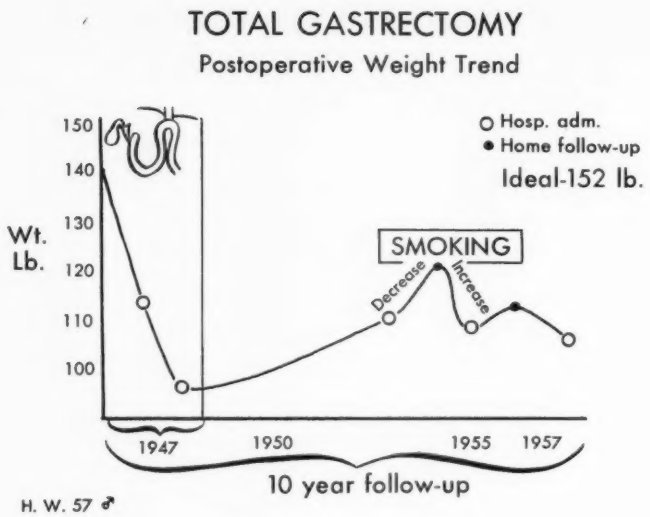

FIGURE 4. Body weight may be increased if smoking is forbidden.

operation. This is a serious mistake. Such ulcers should be subjected to frozen section at the time of operation, following their excision and before a routine total gastrectomy is performed on the patient.

More and more reports indicate that patients can be carried along for years following the loss of their stomachs.[5,6] Observations on one such patient for a period of more than 10 years has shown the value of periodic rehospitalization to study the patient in order to improve his blood components (figure 3).

If the patient's weight is quite low in comparison to his ideal weight, it may be necessary to advise him to stop smoking, since this appears to make a difference of approximately 10 lb. in most patients (figure 4). In addition to the difficulties of maintaining nutrition following gastrectomy, there is the constant problem of combating presenting anemia. The development of pernicious anemia following total gastrectomy has been documented many

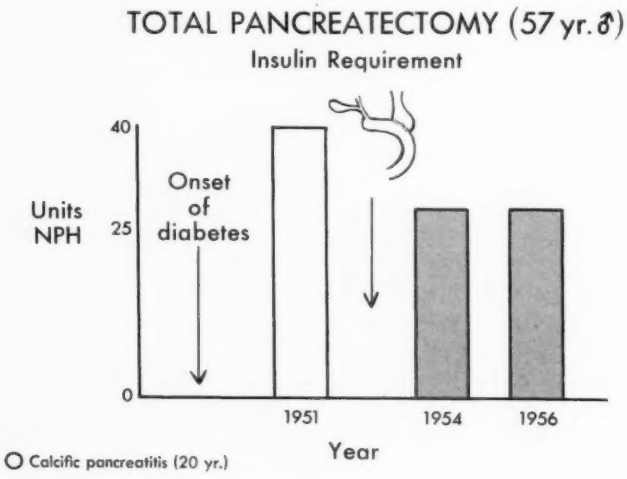

FIGURE 5. Insulin requirements are surprisingly low after total pancreatectomy.

times. Usually it is believed that the anemia does not occur for three or four years,[6] but antianemia treatment should be started immediately following operation. It would appear that the multifactor capsules to be taken orally that are now available are just as satisfactory in maintaining hemoglobin levels as any previous medications which had to be administered by injection (figure 3).

An increasing number of patients are being subjected to subtotal or total resection of the pancreas because they have a malignant tumor, ulcerogenic islet cell tumors or incapacitating chronic pancreatitis. For this reason the physician must be familiar with the problems presented by the loss of this important organ of both external and internal secretion. Sometimes the amount of insulin required by a diabetic is decreased by total removal of the pancreas.[7,8] From personal observations as well as published reports, we have learned that the requirements for NPH insulin rather consistently range between 20 and 30 units daily (figure 5). Recently a study was made of a patient who had had a total gastrectomy and pancreatectomy because of diffuse ulcerogenic tumors involving the entire pancreas. This patient requires only 5 units of NPH insulin per day and at times requires no insulin whatsoever. When more than 5 units was given, a reaction developed. The patient who has had total pancreatectomy, therefore, may have a decrease in his insulin requirements as a result of the removal of the glucagon factor, which is the anti-insulin factor produced by the pancreas.[9] There is a tendency today to leave at least a portion of the pancreas whenever possible.[10] While this may make the patients' demand for insulin a little greater, it may well make their general management easier.[11] In addition to their unusual insulin requirements following total pancreatectomy, the patients have a rather marked decrease in fat absorption, as a result of the loss of the external pancreatic secretion. This is one of the reasons why many surgeons,[12,13] including my associates and I, make an effort to reanastomose the main duct to the jejunum following removal of the head of the pancreas. On the other hand, some prefer to ligate the pancreatic duct following removal of a portion of the pancreas. In general, these patients have a rather marked loss of fat in their stools following any radical procedure on the pancreas. Since fat is a rich source of calories, it is obvious that these patients may have difficulty in maintaining adequate postoperative nutrition. The efficiency of the individual patient's fat absorption, as well as his response to therapy, can be readily checked by triolein I^{131} tracer studies.[12,14]

The fat loss, which may approximate one-third or more of that ingested, can be corrected satisfactorily by the oral administration of pancreatic enzyme replacement. These pancreatic replacements, however, are not always well tolerated by the patients.[15] Some complain of digestive complaints which reach the point where their total caloric intake is so decreased that they would do better not to take the enzyme therapy, despite the increased caloric loss of fat through the gastrointestinal tract. In general, we have tended to utilize viokase in dosages of approximately 3 teaspoonfuls three or four times a day. The majority of patients have tolerated the viokase well. However, from time to time, the patient should be questioned regarding his acceptability of these pancreatic replacements, and it is advisable to try a variety of types to determine which is the most acceptable as far as the patient is concerned. There is good evidence to support the idea that fat absorption is further enhanced by the addition of bile salts to the pancreatic therapy.[16]

In conclusion, the need for long-term follow-up of any patient having a radical procedure on the stomach or pancreas cannot be overemphasized. Readmission into the hospital three weeks, six weeks, three months, six months and one year after surgery should be scheduled. It is the surgeon's moral obligation, if doing radical procedures, to take part in the patient's rehabilitation. Responsibility *does not cease* at the completion of the operation, and continued interest in the patient's late postoperative course is essential for gaining information as to the type of operation best suited to the individual patient in the future.

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Postgraduate Clinical NOTES

93. COMBINATIONS WITH ASPIRIN

Combinations of acetylsalicylic acid with other analgesics such as codeine and acetophenetidin are useful and have gained widespread acceptance. It is doubtful, however, whether these combinations really add anything to the value of acetylsalicylic acid, and for the most part it is better to use acetylsalicylic acid to the maximum degree of its benefit and add the other agents as indicated for a supplementary or enhancing effect, depending upon the dose and the patient's response. Combinations of acetylsalicylic acid with acetophenetidin and caffeine or amphetamine have also been found useful. The same criticism applies to these preparations. It is better to use the acetylsalicylic acid alone in the most efficient manner possible and to add any necessary supplementary stimulation with caffeine or amphetamine as indicated by the patient's needs and responses, rather than to try a multiple preparation that cannot be fitted to the needs of every patient.

Combinations of acetylsalicylic acid or other salicylates with the steroid compounds such as cortisone, hydrocortisone and prednisone have recently been released for use in rheumatoid arthritis. The uncritical use of these preparations is fraught with danger. It is better to give the drugs individually in a dose adjusted to the needs of the patient. In this manner one may obtain the maximum benefit from acetylsalicylic acid and depend much less on the steroids. Thus, the possibility of toxic effect from the steroids or gastrointestinal hemorrhage from steroid or acetylsalicylate is reduced. Ready-fixed compounds force the physician into titrating his patients to fit the drug rather than titrating the drug to the needs of the patient.

Dale G. Friend, Current concepts in therapy, *New England Journal of Medicine*, August 8, 1957, p. 278

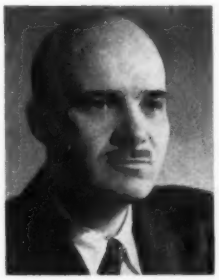
DIAGNOSTIC CLINIC

Adequate and Inadequate Immobilization in Certain Forearm Fractures

JAMES K. STACK*

Northwestern University Medical School, Chicago

MANY years ago during the summers of my college days, I worked in a construction gang. One day the chief engineer took me up on a rise in the ground, and pointing out over the job, he said, "You know, Stack, there are three most important points in the construction of a good road. The first is adequate drainage; the second is adequate drainage, and the third is adequate drainage." We can offer an analogy to that thought now by saying that there are three most important points in the healing of a fracture: first, adequate immobilization; second, adequate immobilization, and third, adequate immobilization.



JAMES K. STACK

This is particularly true of fractures of the forearm, because there we have not only the elements of overriding and angulation, but also that of a constant tendency toward rotatory deformity. Torsion forces, particularly those that are applied against radial fragments, are more effective in promoting nonunion than are angulation or distraction forces, because they are more subtle, and the unwary one may not appreciate them before it is too late.

We should keep in mind that the radius is an extension upward of the hand, and that it is involved in motions of dexterity at the wrist. The ulna is an extension downward of the arm, and it is concerned with movements of strength at the elbow. We can put it another way by saying that one can get along quite well without the upper end of the radius; i.e., the head and neck down to the bicipital tubercle; also, the distal 2 in. or so of the ulna is dispensable. The reverse, however, is by no means true. The radius is the ballerina, the prima danseuse of the forearm combination; the ulna is her relatively inconspicuous partner—the stabilizer that is there to catch, to hold, to support. This artist whirling around

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Presented before the forty-second annual Assembly of the Interstate Postgraduate Medical Association at Chicago.

FIGURE 1a and b. Case 1.

the stable ulna is a delicate and sensitive creature; when hurt, we cannot be sure that she will dance with abandon again—that the radius will again supinate and pronate completely.

In the time available, I cannot go into all phases of the mechanisms of injury and displacement, the management and the end results of fractures of both bones of the forearm, but I can emphasize the important factor of immobilization. We are in an era when bold procedures are being done in all fields of surgery, and this includes the surgery of fractures. I have no quarrel with open reduction and internal fixation as a method of treatment. I use it often. We must remember, however, that internal fixation is not a principle in itself! It is a method of applying a principle, and that principle is immobilization. The adequacy of the immobilization may not be as complete as you may sometimes be led to believe by enthusiasts of internal fixation, and it may have to be supplemented by external forms. Use the method if you wish, but stick to the principle on which it was formulated.

I would now like to present four patients who were kind enough to take the time and bear the inconvenience to help with this clinic.

Case Reports

Case 1—In October 1953 a 49 year old, right-handed man sustained fractures of the left radius and ulna, as well as a dislocation

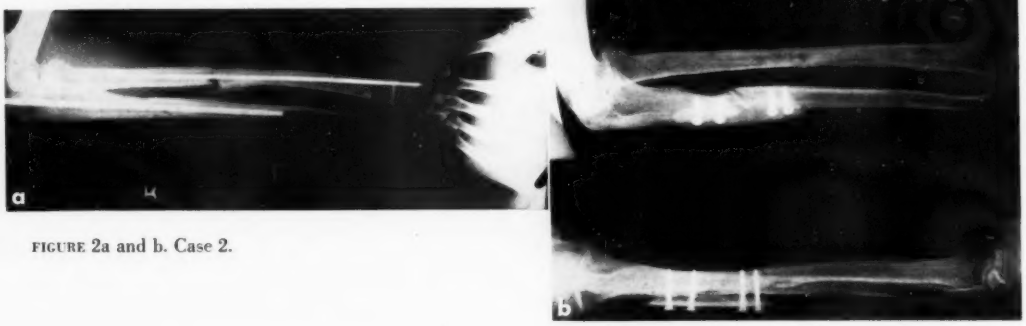


FIGURE 2a and b. Case 2.

FIGURE 3. Case 3.

of the humero-ulnar joint. The patient was admitted to a hospital and the dislocation was reduced immediately. Five days later, open reduction and intramedullary fixation were done on both bones. The radius was fixed with an intramedullary pin inserted from the distal end. The ulna was fixed with an intramedullary pin inserted from the proximal end. Not long afterward, the intramedullary pin in the ulna was removed because of difficulties at the point of its insertion. Approximately one year later, when the patient was admitted to Passavant Memorial Hospital, his forearm was in the condition shown in figure 1a. The distal ulnar fracture had healed, but there was a frank nonunion of the proximal ulnar fracture and the fracture of the radius opposite it.

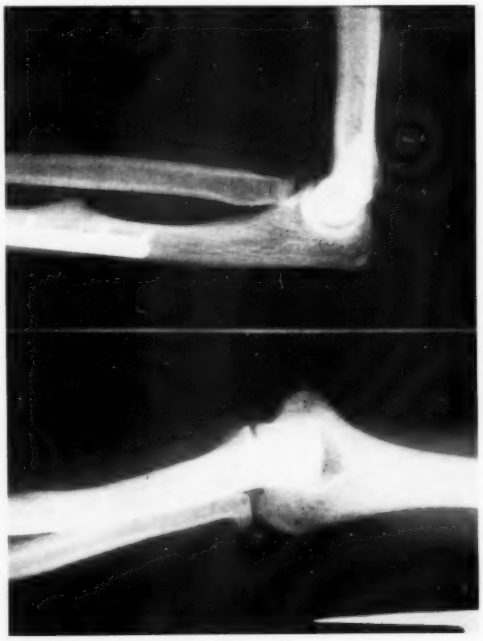


FIGURE 4. Case 4.

On October 4, 1954, a tibial graft was fixed to the ulna and the pin was removed from the radius. Postoperatively the arm was immobilized in an adequate cast extending from the axillary fold to the palmar crease, with the elbow at a right angle and the forearm in a mid or neutral position. Figure 1b shows that while the ulnar graft was healing, the radius, too, healed with no help other than adequate immobilization.

Case 2—On October 1, 1955, a 46 year old, right-handed man sustained fractures of both bones of the right forearm in an automobile accident. Because of other injuries, including a traumatic pneumothorax, treatment of the forearm was postponed for 19 days. At that time, intramedullary rods were inserted in both the radius and ulna (figure 2a). Note that the rod in the radius projected out over the dorsal surface of the carpus, preventing dorsiflexion of the wrist, and that the proximal end of the rod in the ulna projected out into the soft tissues and served as an irritant.

Ten months later, the patient was admitted to Passavant Memorial Hospital. The nails were removed and a bone graft was applied to the ulna. Immobilization was provided by a cast extending from the axillary fold to the palmar crease, with the elbow at a right angle and the forearm in a neutral position. Note that the radius, which has no graft, healed completely during the period of immobilization which lasted for three months.

Case 3—In November 1956 a 38 year old, right-handed man sustained a double fracture of the left radius and a single fracture of the left ulna. After attempts were made to effect closed reduction, the patient was transferred to Passavant Memorial Hospital December 5, 1956, and operation was performed the follow-

ing day. A four screw plate was used to stabilize the fracture of the ulna and to keep it stable during the intramedullary fixation of the radius. The double radial fracture was handled by inserting a Rush-type, curved intramedullary pin from the styloid process of the ulna to a point just beneath the articular surface of the head of the radius. The arm was immobilized for nine weeks in a cast which extended from the axillary fold to the palmar crease, with the elbow at a right angle and the forearm in a neutral position. The proximal radial fracture healed first, with the distal fracture also healing completely about six weeks afterward. (Figure 3.)

Case 4—A 39 year old, right-handed man received injuries of the right forearm in an automobile accident on October 20, 1952. In addition, he had sustained head injuries, an open fracture of the right patella, compressions of several lumbar bodies, and multiple contusions, abrasions and lacerations.

By October 24, his general condition had improved sufficiently to permit surgical treatment of his forearm. His injuries consisted of a severely comminuted fracture of the head of the radius and a fracture of the ulna at the junction of the upper and middle thirds. The elbow was entered through a posterolateral incision, all of the radial head fragments were removed, and the exposed surface of the radius was cleaned off. The incision was then extended posteriorly and distally to bare the fracture of the ulna which was plated with a four screw plate. No cast was used, but an immobilizing pressure dressing was applied over the elbow and forearm until the wound was healed 7 to 10 days later. This method of firm immobilization of the ulna was selected in order to mobilize the radius as soon as discomfort would permit. The patient was encouraged to supinate and pronate his forearm and to flex and extend his elbow during the period of healing of the ulna. Plate fixation was considered adequate for immobilization. The resultant solid healing, without a postoperative cast, is shown in figure 4.

The cases discussed illustrate the point that intramedullary fixation of fractures of the bones of the forearm cannot always by itself provide adequate immobilization. These cases also demonstrate that fractures will heal even though they are frankly ununited, if adequate immobilization is provided. It has also been shown that firm plate fixation of the ulna alone is sufficient if there is an intact radial shaft.

Scientific Exhibit

CYTOLOGIC TECHNICS

For Office and Clinic

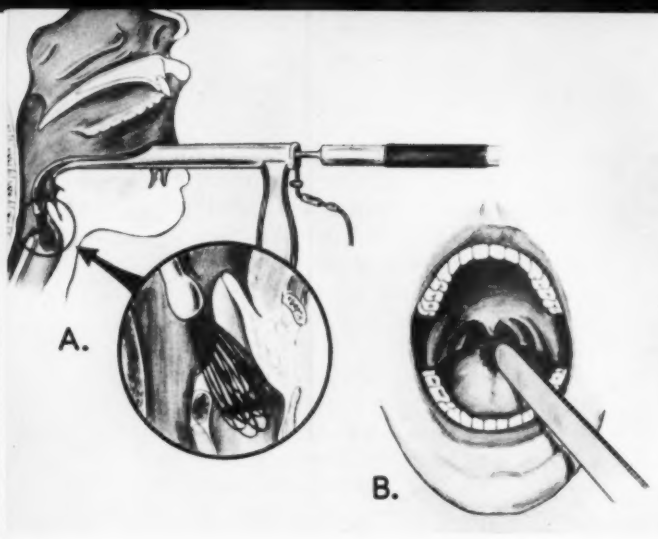
HERBERT E. NIEBURGS
Department of Pathology
Mount Sinai Hospital, New York

apted from an exhibit shown at the 1957 annual meeting of the American Medical Association.

EARLY CANCER DETECTION

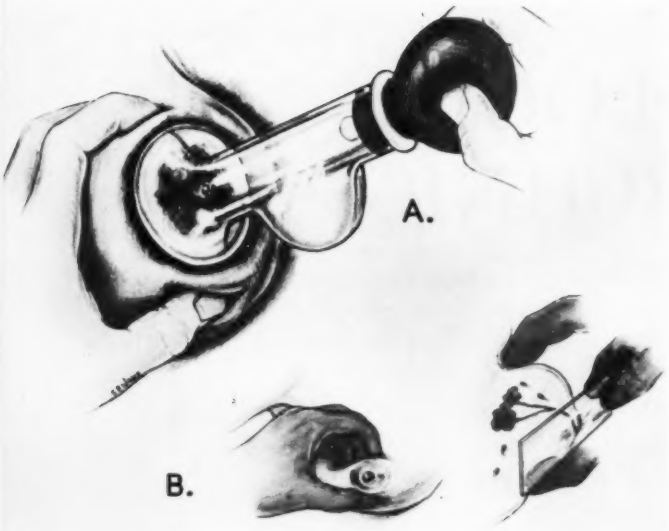
Cell Collection Technics

(*See Preparation of Smears, page 312*)



Larynx and Oral Cavity

A. Surface abrasion of vocal cords with nylon fibers.
B. Tongue lesion: Scrape deeply.



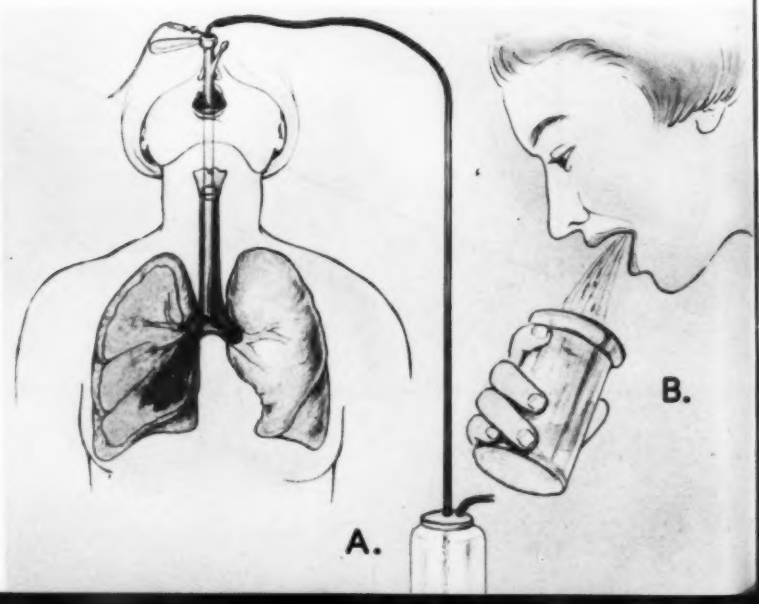
Breast

A. Induction of secretion by hand pump.
B. Smear prepared during gentle massage.

Lung

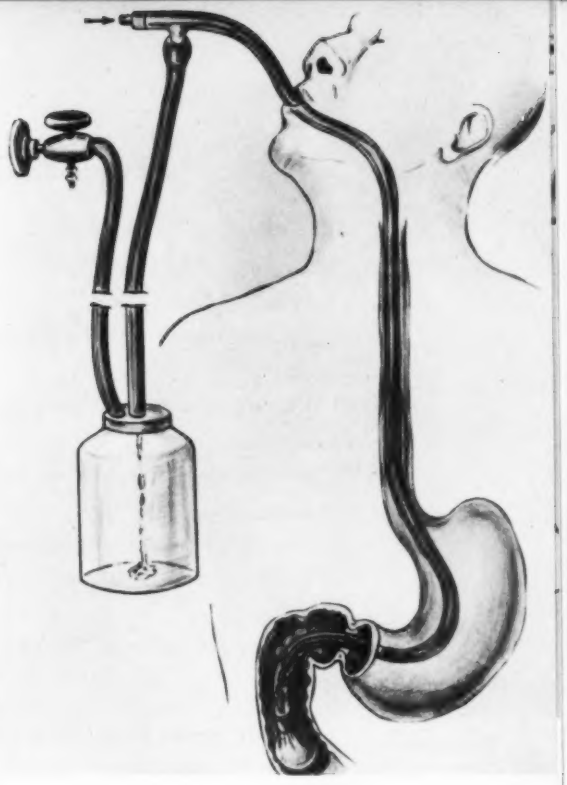
A. Collect bronchial aspirate in 50 per cent alcohol.
B. Collect deep cough in 70 per cent alcohol.

Send to laboratory at once.



Duodenal Drainage

Collect in container immersed in crushed ice to reduce enzymatic digestion.



Prostate

Collect secretion during gentle massage. Also, urine voided following massage should be examined.

Sigmoid

Surface abrasion with retractable nylon fibers.

Preparation of Smears

- **Larynx and Oral Cavity**
  Prepare smears on A.[1] Fix according to C.[3]
- **Breast**
  Prepare smears on A. Fix according to C.
- **Lung**
  Prepare smears at once on A. Fix according to B[2] (30 minutes) or C.
- **Duodenal Drainage**
  Centrifuge at once at 5000 rpm for three minutes. Prepare on A. Fix according to B or C within 10 minutes of collection.
- **Prostate**
  Prepare smears on A. Fix according to C.
- **Sigmoid**
  Prepare smears on A. Fix according to B or C.
- **Colon**
  Cleanse intestinal tract adequately. Centrifuge and prepare smears on A. Fix according to B or C.
- **Serous Effusions**
  Fix in equal volume of 50 per cent alcohol or 10 per cent aqueous solution of formalin (red blood cells destroyed by 5 per cent acetic acid). Viscosity reduced with 0.5 to 1 cc. hyaluronidase to 9 cc. of fluid. Centrifuge at 3000 rpm for 10 minutes. Prepare sediment smears on A. Fix according to B or C.
- **Urine**
  Fix at once in equal volume of 95 per cent alcohol or add 10 cc. of formalin to each 90 cc. of urine. Centrifuge at 2000 rpm for 15 minutes. Add egg albumen to improve cellular adherence. Prepare sediment smears on A. Fix according to C.

1. A Use egg albumen-coated slides.
2. B Equal parts 95 per cent alcohol and ether (place slides into solution at once).
3. C Release a few drops of fixing and surface-coating solution onto slides. Allow to dry. Dissolve coating in laboratory before staining (see "Dry Smear Method"). Diaphene solution (Papanicolaou) may also be used.

Dry Smear Method

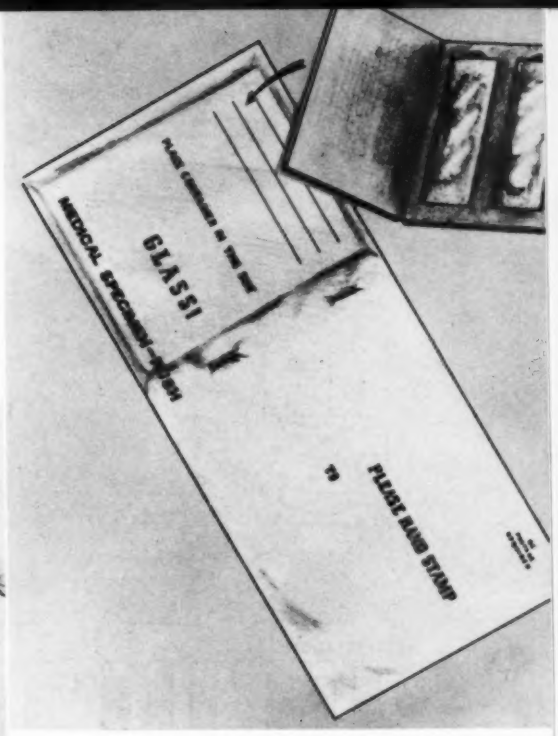
Do not place slides into ether alcohol.

Capsule for Dry Fixation and Surface Coating

For specimens other than vaginal and cervical

Dissolve 50 mg. capsule (hydroxypropyl methylcellulose ether) in 10 cc. hot water. Add 190 cc. ether alcohol solution.

Fix with several drops of fluid. Allow to dry. A protective film forms.

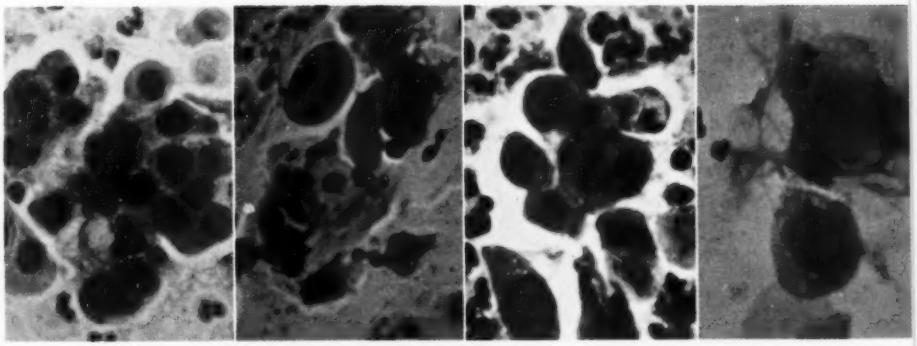


The fixed and protected smears can be mailed to laboratory. Before staining, surface coating is dissolved in water.

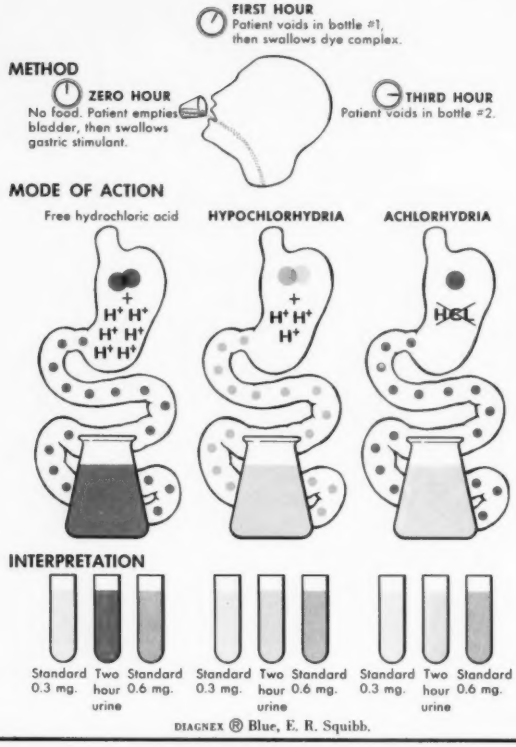
Rehydration of Smears

Vaginal and cervical only
Dried in air without previous fixation

Unfixed cervical and vaginal smears can be rehydrated with 50 mg. capsule (hydroxypropyl methylcellulose ether) dissolved in 400 cc. water and 200 cc. ether alcohol.



Quality of dried smears after rehydration is equal to immediately fixed smears.



DIAGNEX ® Blue, E. R. Squibb.

GASTRIC CANCER CONTROL

New York City Department of Health Project

Leona Baumgartner, M.D., Commissioner
Division of Cancer Control and Research
(A. Oppenheim, M.D., Director)

Tubeless Gastric Analysis

Gastric Acidity and Cancer

- Achlorhydria is found in 70 per cent of patients with gastric carcinoma (Hurst).
- Gastric carcinoma is three times more frequent in individuals with achlorhydria; it is 10 to 12 times more frequent in patients with pernicious anemia (Jenner, Rigler, Kaplan and Hitchcock).

New York City Department of Health Project

Mount Sinai Hospital
H. E. Nieburgs, F. Hollander, H. Janowitz, J. L. Werther

Beth Israel Hospital
J. S. Rechtschaffen, L. Venet, M. Weingarten

Brooklyn Jewish Hospital
S. S. Gilbert, M. J. Matzner, A. J. Brenner

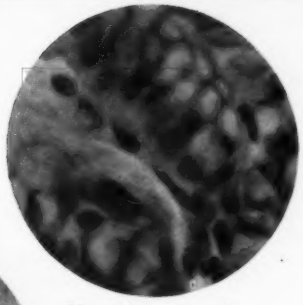
Pack Medical Group
A. Ariel

City Cancer Detection Clinics
A. Abramson

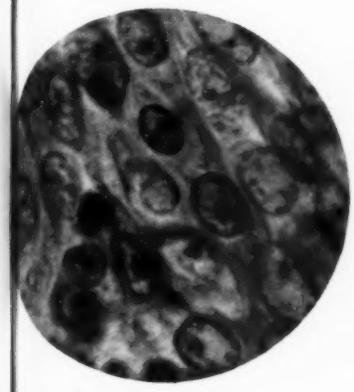
Beth El Hospital
H. E. Nieburgs, S. Stark, M. Dannenberg, S. Dannenberg

- Detection of the presence or absence of free gastric acid is carried out on individuals over age 40 by the tubeless gastric analysis technic developed by Segal, Miller and Plumb.
- All patients with achlorhydria are examined at yearly intervals by abrasive cytology, x-ray and gastroscopy.
- All individuals over age 40 with free hydrochloric acid are to be retested by their own physician at yearly intervals for gastric acidity.

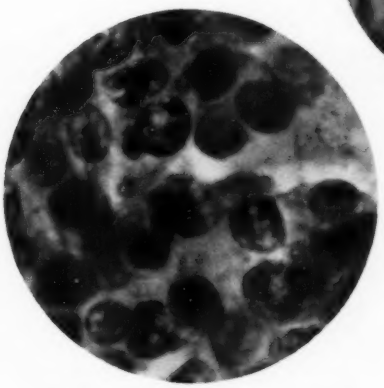
Abrasive Gastric Cytology



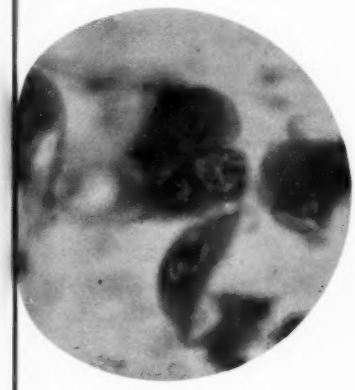
Normal gastric cells



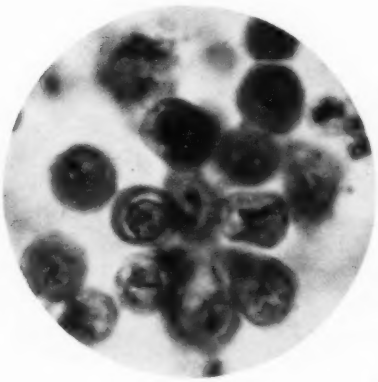
Pernicious anemia



Pernicious anemia with carcinoma



Carcinoma



Carcinoma

PREPARATION OF SMEARS

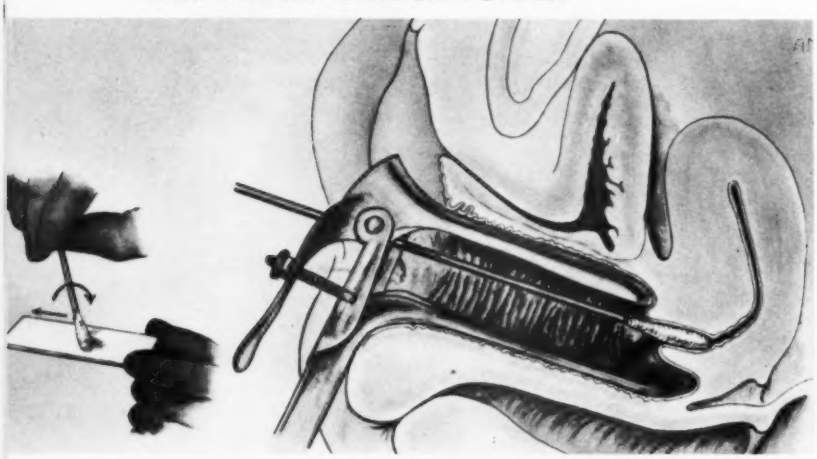
Immediate fixation by release of several drops of fixing and surface-coating solution (see "Dry Smear Method").

COLLECTION OF GASTRIC CELLS WITH RETRACTABLE NYLON FIBERS (NIEBURGS)

Introduce tube with fibers retracted. Rotate fibers in stomach between cardia and pylorus. Withdraw tube with fibers retracted and prepare smear.

Uterine Cancer Control

Cervical Carcinoma

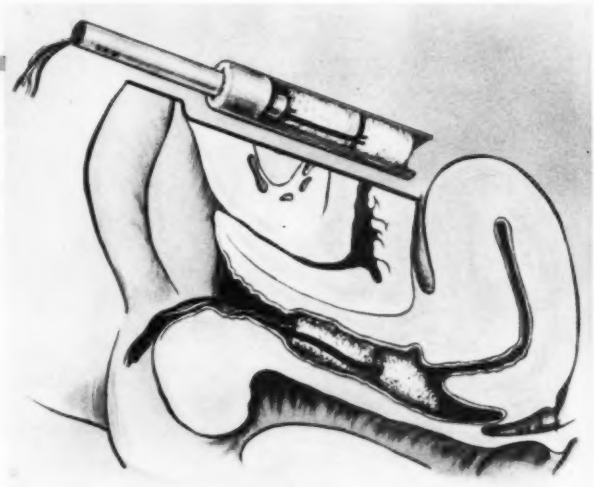


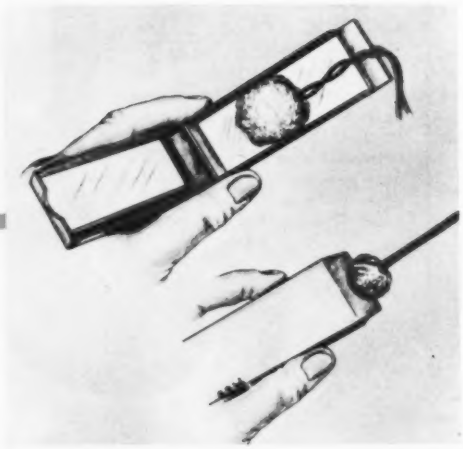
ENDOCERVICAL SMEAR

Introduce thin cotton applicator into cervical canal, twirl and secure transfer of mucus plug by turning axis of applicator opposite to its direction on the slide.

DIAGNOSTIC TAMPON WITH AUTOMATIC SMEAR PREPARATION (Nieburgs)

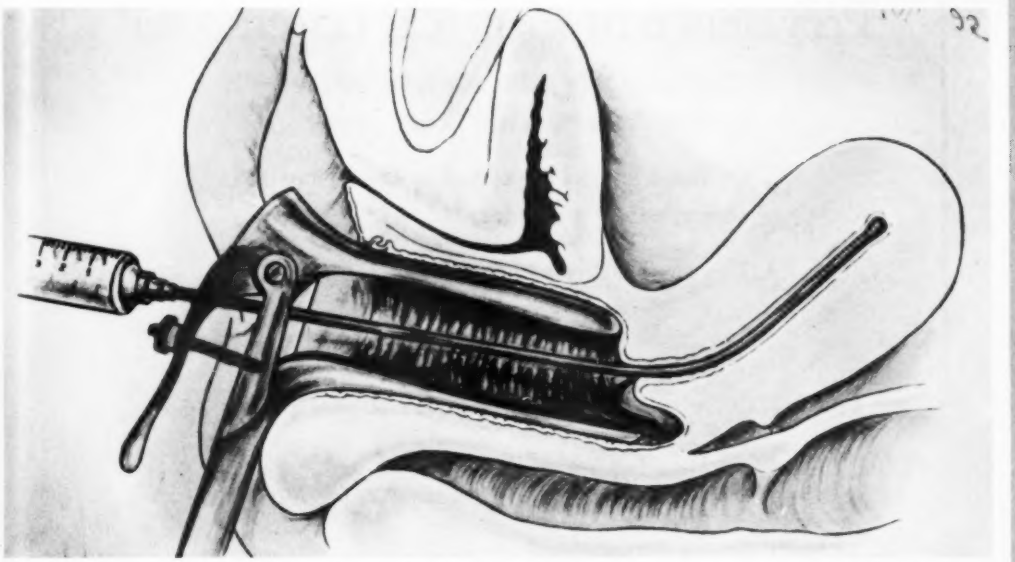
Leave diagnostic tampon in vagina 6 to 12 hours.



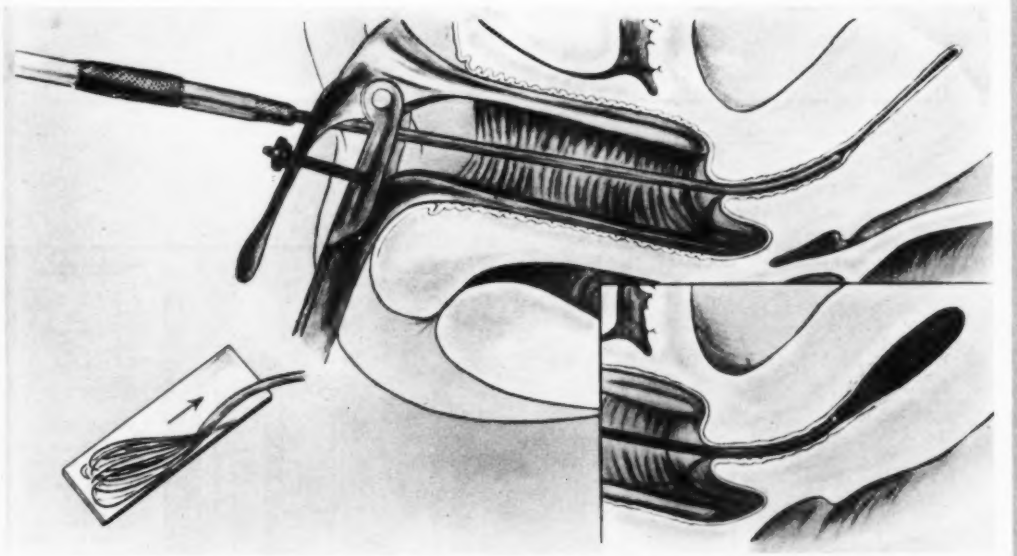


Tampon with cervical material is inserted into box, pulled between two slides and out through open end. Two smears are made in this manner.

Endometrial Carcinoma



Aspiration with small cannula.



Cell collection with retractable nylon fibers.*

*Gastric and endometrial brush available from Cochrane Physicians Supply Company, New York.

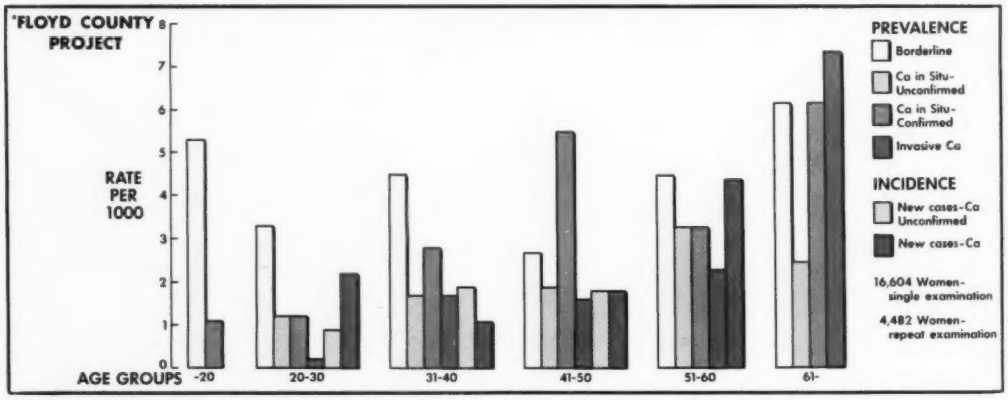
Illustrations on pages 310, 311, 316 and 317 from NIEBURGS, H. E.: Cytologic Technics for Office and Clinic. New York, Grune & Stratton, 1956.

Prevalence of Cervical Carcinoma*

1. 4.2 of every 1000 white women over the age of 20 have cervical carcinoma.
2. Of these 2.8 per 1000 harbor the lesion in an asymptomatic *in situ* stage.
3. This can be detected by routine cytologic smears.

Incidence of Cervical Carcinoma*

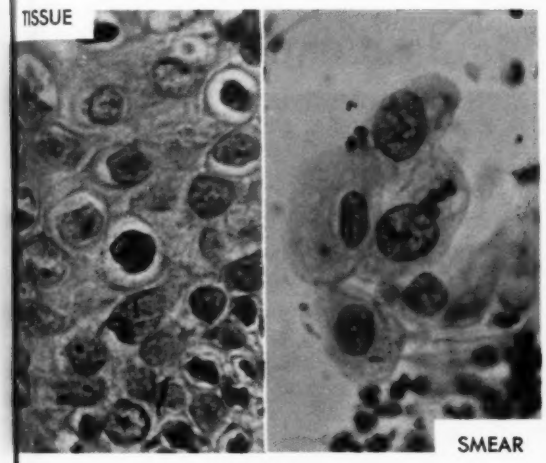
1. Every year 1.8 of every 1000 white women over the age of 20 develop cervical carcinoma.
2. Routine cervical smears could eliminate invasive carcinoma of the uterine cervix.



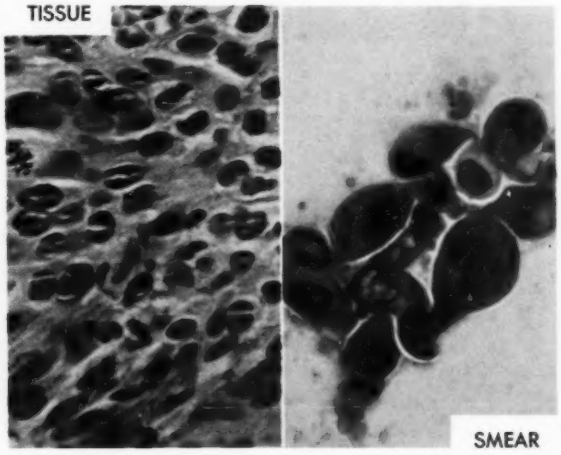
Morphogenesis of Cervical Carcinoma

1. Proliferation of basal or subcylindric (reserve) cells with or without dysplasia may progress to carcinoma *in situ* and invasive carcinoma.
2. The process of malignant transformation is asymptomatic until invasion begins.
3. The stage of carcinogenesis can be detected by cytology and diagnosed with the aid of biopsies.

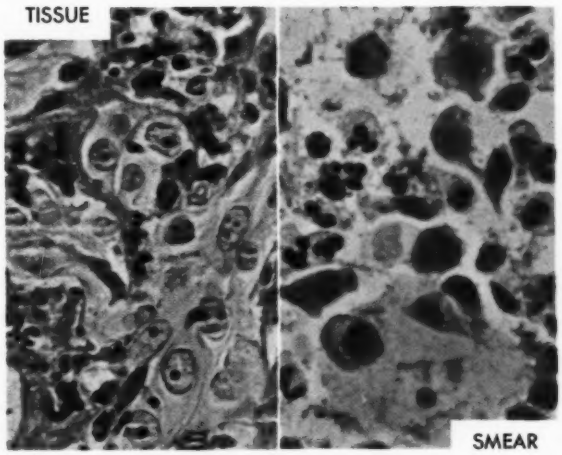
Case Histories



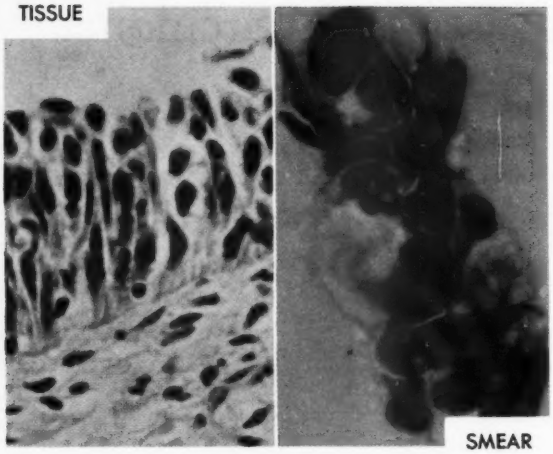
May 1952.
Basal cell proliferation.



August 1954.
Carcinoma *in situ*.

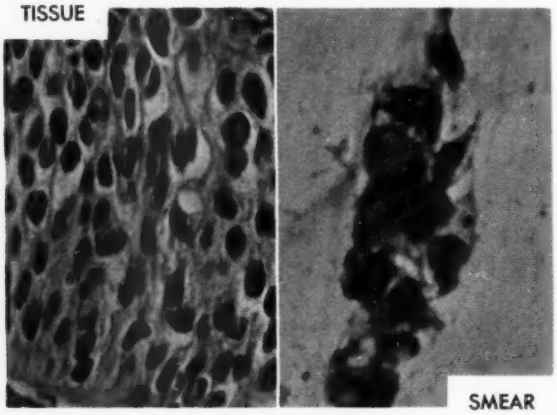


November 1956.
Early invasive carcinoma.



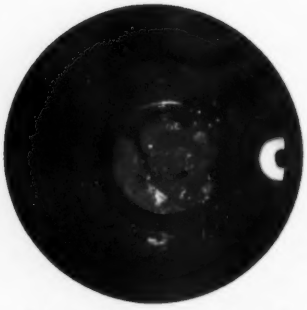
Normal-appearing cervix.

February 1952.
Reserve cell proliferation.

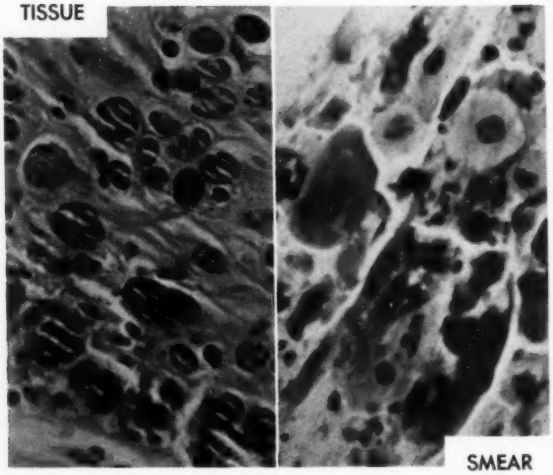


January 1954.
Dysplasia.

March 1956.
Carcinoma *in situ*.



Advanced invasive carcinoma.



Milledgeville State Hospital Project.

The Hearing Handicapped; Their Education and Rehabilitation

S. RICHARD SILVERMAN*

Washington University, St. Louis

S. RICHARD SILVERMAN

In the past two decades a wide variety of factors, not wholly unrelated, have stimulated interest in education and rehabilitation of persons with impaired hearing. They include development of refined electro-acoustic instruments, particularly audiometers, to measure hearing loss; improvement of electronic hearing aids; evolution of fenestration[1] and stapes mobilization[2] for otosclerosis and of reconstructive surgical procedures for the middle ear;[3,4] development of promising technics in psychoacoustics, auditory biophysics and physiology;[5-8] recognition of the problem of noise-induced hearing loss in industry and in the armed forces;[9,10] and a growing public awareness of the rehabilitative needs and the social and economic potential of handicapped persons.

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Forward-looking management of persons with impaired hearing requires (1) dissemination of information to the public about hearing impairment and acoustic hygiene,[11,12] (2) case finding through screening programs in clinics for babies and in schools and through physical examinations prior to employment, (3) complete diagnosis, (4) appropriate medical and surgical treatment, (5) thorough assessment of hearing after completion of all indicated medical and surgical procedures, with particular attention to educational and rehabilitative needs, and (6) special measures including hearing aids, lip reading, speech correction and conservation, vocational planning and psychologic guidance.[13]

This discussion centers on hearing impairment as it interferes with or retards social efficiency in its broadest sense, and does not include a consideration of hearing impairment as a symptom of auditory disease.

Terminology

A frequent source of abuse and extravagant claims of accomplishment in the field of physical medicine and rehabilitation is the confu-

sion in terms applied to the kind and degree of disability. This situation applies to impaired hearing as well as to other disabilities.

The confusion surrounding the precise classification of impaired hearing seems to arise in differences in frameworks of reference. For example, some workers classify a person who learns to speak prior to the onset of deafness as "hard of hearing" even though he may be unable to hear pure tones or speech at any intensity. Others argue that such a person, unlike the congenitally deaf person who has not acquired speech, has relatively natural or "normal" speech and therefore should not be classified as "hard of hearing." It is obvious that a not-too-precise educational standard has guided the labeling if not the definition of hearing impairment. From a purely physiologic standpoint it is grossly misleading to term a person "hard of hearing" when for all practical purposes he hears nothing.

Terms that suggest gradations of hearing loss and time of onset, in addition to physiologic, communicative and educational factors, complicate the situation further. To this category belong "deaf and dumb," "mute," "deaf mute," "semi-deaf," "semi-mute," "deafened," "partially deaf" and others. These terms are of little value from the physiologic, communicative, rehabilitative or educational standpoint and it would be well to eliminate them from general use.

Various schemes for classifying impairment of hearing have been suggested.[13] The one proposed in 1937 by the Committee on Nomenclature of the Conference of Executives of American Schools for the Deaf is most suited to this discussion.

Deaf: Persons in whom the sense of hearing is nonfunctional for the ordinary purposes of life. This general group is made up of two distinct classes based entirely on the time of the loss of hearing—the congenitally deaf, those who were born deaf; and the adventitiously deaf, those who were born with normal hearing but in whom the sense of hearing became nonfunctional later through illness or accident.

Hard of hearing: Those in whom the sense of hearing, although defective, is functional either with a hearing aid or without one.

Some workers object to the restricting influence of definitions[14] and classifications, and others have suggested classifying physical disability on some psychologic scale of behavior which may be more descriptive of how the person lives with his disability.[15] Nevertheless we must agree on some terms and so I shall use the terms "deaf" and "hard of hearing" as defined by the Conference proposal. This classification implies that the significant dimensions related to education and rehabilitation of deaf or hard-of-hearing persons are amount of hearing loss and time of its onset.

Amount of Hearing Loss

The audiogram is the most commonly accepted measure of hearing loss. It indicates loss of sensitivity of the ear in decibels for the six frequencies (sometimes seven) from 125 to 8000 cycles per second (cps). For the purpose of this discussion it is sufficient to express the over-all hearing loss as the average of the losses at 500, 1000 and 2000 cps, as these are frequencies most important for hearing speech. A sample audiogram is shown in figure 1.

Knowledge of losses at other frequencies aids in diagnosis, but this is not pertinent to this paper. Of course, patterns of audiometric losses may vary even in the frequencies 500 to 2000 cps and influence the types of communicative difficulties encountered by the listener. For example, persons who have better sensitivity at 500 than at 2000 cps may hear but not understand and may ask the talker to speak *clearer*. The reverse situation may cause the listener to ask the talker to speak *louder*. In the former instance the primary difficulty is with discrimination, while in the latter it is sensitivity.

Despite the possible variations, I believe the outline in table 1 is useful in understanding the relation of the amount of hearing loss to communicative efficiency. In general the critical points are a loss of 30 db, where communicative difficulty begins, and perhaps a little more than 60 db, where the visual system supplemented by hearing is likely to be the primary channel of communication. Based on the aforementioned definitions proposed by

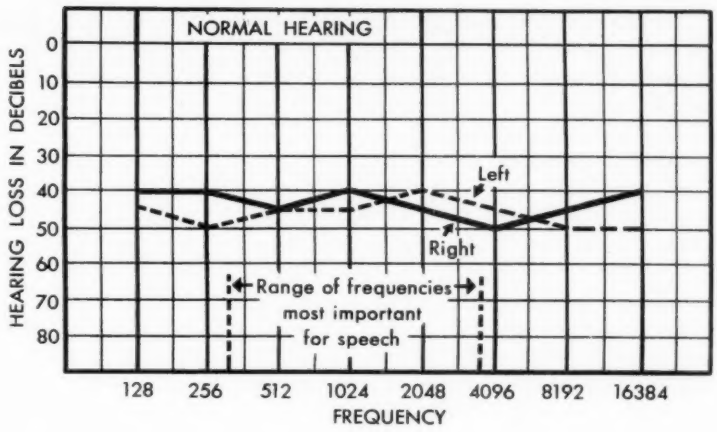

FIGURE 1. A sample audiogram. This kind of "flat" hearing loss may be produced by chronic otitis media. Hearing by bone conduction (not shown) is presumably normal.

(From Davis, H.[16])

the Conference of Executives of American Schools for the Deaf, persons in groups 1, 2 and 3 in table 1 would be termed hard of hearing, and all in group 5 would be considered deaf. Group 4 represents a transitional stage and is likely to contain both hard-of-hearing and deaf persons.

Time of Onset of Hearing Loss

An important point in life in regard to time of onset of hearing loss is roughly from three to five years of age. A child born with a hearing loss of more than 60 or 70 db or a child in whom such a loss occurs before the age of three to five years probably will not develop the expressive and receptive skills of communication a hearing child does. He will not initiate language through speech nor will he understand the speech of others unless he receives special education.

If hearing loss occurs after early childhood, the teacher or therapist must determine the individual requirements according to the amount of residual hearing and the memory the child has retained for language and speech.

Education and Rehabilitation of Hard-of-Hearing Persons

In addition to clarification of terms, I believe the best antidote for abuses in this field is a delineation of acceptable educational and rehabilitative measures. For the present purposes it is convenient to discuss hard-of-hearing persons and deaf persons separately, although there are elements common to both groups.

TABLE 1

RELATION OF AMOUNT OF HEARING LOSS TO COMMUNICATIVE EFFICIENCY

AMOUNT OF HEARING LOSS	EFFECT
1. *Less than 30 db*	May have difficulty hearing faint or distant speech, is likely to "get along" in school and at work requiring listening.
2. *30 to 45 db*	Understands conversational speech at 3 to 5 ft. without too much difficulty. May have difficulty if talker's voice is faint or if face is not visible.
3. *45 to 60 db*	Conversational speech must be loud to be understood. Considerable difficulty in group and classroom discussion and perhaps in telephone conversation.
4. *60 to 80 db*	May hear voice about a foot away, may identify environmental noises and may distinguish vowels, but consonants are difficult to perceive.
5. *More than 80 db*	May hear only loud sounds.

The most helpful and generally acceptable measures for hard-of-hearing persons are hearing aids, including auditory training; instruction in lip reading; speech conservation and correction; and educational, vocational and psychologic guidance.

Hearing aids—This term refers to the modern electronic hearing aid rather than mechanical or obsolete electric types.[16] Essentially a hearing aid is a miniature telephone. It consists of a microphone, an amplifier, batteries (most hearing aids now have one battery), and a receiver. The voice of the talker impinges on the microphone and is converted to electric energy supplied by the battery. The amplifier delivers a stronger current to the receiver, which converts it back to sound. Advances in telephony and radio have influenced the design of hearing aids.

Any person who has hearing difficulty in everyday situations should consider the purchase of a hearing aid. Audiograms are helpful guides in determining whether or not a hearing aid is indicated. If hearing loss in the better ear is more than 30 db, a hearing aid is indicated. However, the prospective purchaser must be warned that no hearing aid will make him hear perfectly despite some optimistic statements made about instruments. If the loss is severe the hearing aid supplements communication by vision, and if there is a discrimination loss the person who uses a hearing aid needs intensive auditory training to achieve optimal or even any help from the instrument. Auditory training consists of systematic and guided listening experiences and is helpful for both children and adults.[13]

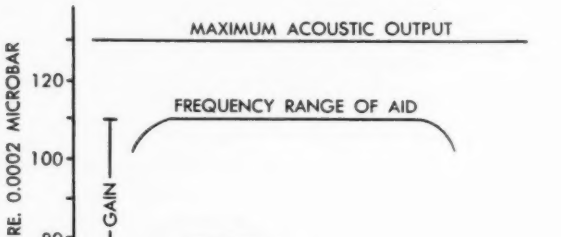

FIGURE 2. Operating range for hearing aids. The graph shows the three basic performance characteristics for hearing aids. The shaded area indicates the intensity and frequency range of conversational speech. The three characteristics are (1) gain, showing the vertical displacement of conversational speech, (2) frequency range, showing the range of frequencies which hearing aids can transmit, and (3) maximal acoustic output, the point at which the intensity is limited.

(From Silverman, S. R. and Benson, R. W.[17])

What factors influence the performance of a hearing aid? First, it should have sufficient gain, i.e., ability to increase the intensity of sound to overcome the loss of sensitivity. The gain should be at least 30 db, and in some cases it should be 60 db. Secondly, it should have an adequate frequency range. Benson and I[17] have stated previously that our main interest in helping persons who are hard of hearing is to improve their communication by speech, and we are not concerned with the more difficult problem of providing the listener with symphonic music. The frequencies from 200 to 4000 cps contain all the necessary speech energy, whereas music contains energy from 20 to 15,000 cps. A hearing aid need only reproduce sounds in the frequency band from 200 to 4000 cps. Noises that contain energy in lower or higher frequencies then do not distract the listener. A third and important factor is the maximal acoustic intensity the hearing aid will generate. Studies made to determine the maximal intensity of sounds we are able to hear without discomfort and pain have shown that for most persons a sensation of pain may occur at sound intensities of 130 db and greater.[18] A hearing aid should limit the sound intensity it will produce.

Figure 2 represents graphically the three basic performance characteristics of hearing aids. Of course in practice the frequency response is not as flat as shown in the illustration. Taylor and I[19] have suggested some hints for the prospective user in selecting a hearing

FIGURE 3. Progress in miniaturization of electronic hearing instruments is illustrated by a 1945 model in background, a 1952 model in center foreground, and a 1957 model in fingers at right (courtesy Sonotone Corporation, Elmsford, New York).

aid, and they are related to these basic performance features.

Hearing aids have had a phenomenal acceptance in the past five years, probably largely because of the advent of the transistor, a substitute for the larger vacuum tube. It has been possible to reduce the size and weight of hearing aids without affecting electro-acoustic performance seriously (figure 3). The transistor also has eliminated one of the batteries. Emphasis on cosmetic features has stimulated the development of hearing aids built into the temples of spectacle frames. However, acoustic feedback or "squeal" resulting from placement of the microphone close to the receiver may limit the value of such instruments for persons with severe hearing impairment. This type of hearing aid introduces the possibility of providing true binaural hearing, i.e., one complete instrument for each ear. Investigations are under way to determine the conditions under which amplified binaural hearing is advantageous.

All too frequently the promotional literature on hearing aids emphasizes the concealment of hearing loss. From the standpoint of rehabilitation this may be one of the major abuses in the field of hearing impairment. A cardinal principle of good mental health is recognition of reality and adjustment to it. It is a disservice to handicapped persons to encourage them to evade reality. Some dealers are to be commended for emphasizing that the wearing of a hearing aid is a demonstration of courtesy since it spares the wearer's associates and family from having to shout or repeat.

Lip reading—Lip reading, sometimes called speech reading because it involves observing more than the lips, is the process through which a person understands speech by carefully watching the speaker.[20] For hard-of-hearing persons it is an essential supporting skill. The eye and the ear together apparently are better than either one alone, and for this reason there has been emphasis in recent years on associating lip reading instruction with hearing and with auditory training.[21,22]

The ability to master lip reading varies from person to person, as does any skill. Factors that contribute to success are complex and difficult to analyze, but the following are significant: distance, light, position, character of

the talker's speech (precision and rate of articulation), sectionalisms, facial expressiveness and, of course, familiarity of the lip reader with the speaker; the language material (level of vocabulary and language structure); and factors related to the lip reader himself such as his vision, ability to synthesize from contextual clues, intelligence, general information, ability to recognize discrete units of speech and to associate his own "feel" for speech with the speech he sees on the lips, and finally the fundamental structure of his personality, which may determine his attitude toward lip reading.

Lip reading is further complicated by ambiguities that result from hidden lip movements such as those of the letters *h* and *k*, homophonous words that look alike on the lips (*package* and *baggage*), and the difficulty of appreciating patterns of stress and intonation. Despite these obstacles, all hard-of-hearing children and adults should have ample opportunity to learn to read lips.

Speech correction and conservation—The major speech problem with hard-of-hearing persons is correction and conservation of speech. They do not hear speech and speech patterns clearly and therefore have a poor model for imitation. Furthermore, defective hearing prevents adequate monitoring of articulation and phonation. Characteristic errors of articulation involve the mutilation or omission of sibilants such as *s* and *sh* and of word endings. Deviations of vocal quality may tax listener effort. All these speech defects, of course, depend on time of onset of hearing disability, the amount of loss, and the extent of corrective training. Many hard-of-hearing persons do not have detectable disorders of articulation or voice, but speech may deteriorate as time passes or as the impairment increases. It is therefore desirable to include in the rehabilitation and education of these persons work in speech conservation in order to prevent deterioration.

In addition to conventional methods of speech correction, technics should include learning to listen to good models of speech over hearing aids, creating kinesthetic awareness by feeling vibrations connected with production of speech, and encouragement of good speech by associates and family of the hard-of-hearing person.[23]

Educational, vocational and psychologic guidance—Any counselor needs to know the interests, aspirations, aptitudes, abilities and limitations of his clients. To provide guidance for hard-of-hearing persons, one should be aware of the possibilities of education and rehabilitation to reduce the limiting effects of the hearing handicap and thereby raise the level of employability. One must be aware of the possibility of further damage from exposure to intense noise[24] and at the same time know that some hard-of-hearing persons work better in noisy environments because their hearing impairments act as built-in noise excluders.

Educational guidance for hard-of-hearing children should recognize the particular needs listed in table 2.[13] With proper recognition of the difficulties and with appropriate auxiliary aid, children whose hearing impairment is from less than a 30 db loss to a 60 db loss (groups 1, 2 and 3 in table 2) and some in group 4 may be placed in a special class for the hard of hearing within a public school system or in a regular classroom. Where the child

TABLE 2

EDUCATIONAL NEEDS OF CHILDREN WHO ARE HARD OF HEARING

1. *Hearing loss less than 30 db*	Lip reading and favorable seating.
2. *30 to 45 db loss*	Lip reading, hearing aid (if suitable) and auditory training, speech correction and conservation, favorable seating.
3. *45 to 60 db loss*	Lip reading, hearing aid and auditory training, special language work, favorable seating or special class.
4. *60 to 80 db loss*	Probably special educational procedures for deaf children with special emphasis on speech, auditory training and language, with the possibility that the child may enter regular classes.
5. *More than 80 db loss*	Special class or school for the deaf. Some of these children eventually enter regular high schools.

is placed depends on his hearing loss and the availability of special help. The latter includes special classes, itinerant teachers, and speech and hearing clinics in a university or hospital or provided by a society for the hard of hearing. Downs and Carson[25] published a list of centers that serve both children and adults with hearing handicaps.

There is no agreement as to the existence of a set personality structure for hard-of-hearing persons,[15] but in general, as I already stated, they need to be made aware of their handicaps and, as Ramsdell[26] suggested, "The most successful adjustment is the one that overrides and submerges the handicap in normal activities centering outside one's self."

Education and Rehabilitation of Deaf Persons

For this section I have drawn extensively from the chapter written for the recently published "Handbook of Speech Pathology."[13]

Education of deaf children—How we go about educating deaf children obviously is related to the goals we have set for them, and these goals are in turn determined by what we consider the over-all potential of deaf persons—educational, psychologic and social. Stated another way, some of the sharp differences of opinion as to the most desirable arrangements and methods for educating deaf children have their roots in fundamental differences in regard to the long-range outlook for them.

The overwhelming amount of literature on education of deaf children (a bibliography would probably exceed 2000 titles) ranging from school papers and convention resolutions to lengthy sections of books reveals an intense polemicism resting in the main on a nonexperimental empirical foundation. From the stated views and practices, three "schools of thought" emerge. I am aware that I may be indulging in caricature and that "it all depends on the individual child," but I believe a sorting out of views is desirable if we are to understand the rationale for particular opinions in regard to education of deaf children.

One group appears to stress the limitations, especially social, of deafness, pointing up such issues as exclusion from certain types of employment, effect on insurance practices and legislation, the implication of what amounts to minority status in certain educational and social contexts, the impact of isolation from other deaf persons, the difficult if not impossible task of learning speech and lip reading, and the misunderstandings of the general public concerning the abilities and aspirations of deaf persons. This group would "suit the method (of communication) to the child," and the following statement best summarizes its view.

"The aim of the education of the deaf child should be to make him a well-integrated, happy deaf individual, and not a pale imitation of a hearing person. Let us aim to produce happy, well-adjusted deaf individuals, each different from the other, each with his own personality. If a child cannot learn to read lips well or cannot speak well, far better to develop other modes of expression and communication, writing and gesturing, than make him feel ashamed and frustrated because he cannot acquire the very difficult art of speech and lip reading. Our aim must be a well-balanced, happy *deaf* person and not an imitation of a hearing one."[12]

A second school of thought emphasizes the great untapped possibilities for deaf persons, particularly for education and participation in a world of hearing people. This group is likely to stress the importance of early education and the great potential of auditory training and to emphasize the objective of "normalization"—"deviating only insignificantly from persons with normal hearing."[27] In essence there is "one world" in which the deaf person must function and that is a world of hearing and speaking people. There is no separate world for the deaf.

A third group points to the record of economic, academic and social achievement of deaf persons *among the deaf and the hearing* as strong, tangible justification for its belief that forward-looking, proper and early fundamental training enables the deaf child to realize his potentialities. Yet it is apparent, at least at present, that there are situations in which the deaf may always be marginal, and our approach to them should be influenced accordingly. Realism impels us to spare parents and the child himself the psychologic distress

that stems from failure to achieve what was set up as an attainable goal of "normalcy."

Until more facts are available to fill the open spaces now occupied by opinion, a rational attitude seems to point to a recognition that deafness imposes certain limitations that must be accepted, while at the same time proper education in its broadest sense strives to couple the deaf person to the world about him in a psychologically satisfying way.

Because educators agree universally that every deaf child should have an opportunity to communicate by speech, I shall direct attention solely to this approach to his education, which is called oralism. Some educators advocate supplementing or supplanting oral instruction with other forms of communication. One of these is the manual alphabet, a method of forming the letters from *a* to *z* by certain fixed positions of the fingers of one hand. This is a form of "writing" in the air. The language of signs is another form of communication. This is a system of conventional gestures of the arms and hands that suggest the shape, form or thought they represent. The combined method, which attempts to make available speech communication, the manual alphabet and the language of signs, depends on the aptitude of the child and the context of the communication. For example, the language of signs and the manual alphabet are frequently employed in public assemblies. The combined method is usually employed in public residential schools.

Perhaps the most significant fact about education of the deaf in the United States is that it is universally available to all deaf children of school age. Of course the quality of education may vary, but no child need be denied the opportunity for it.

About 75 per cent of the children enrolled in schools for the deaf attend public residential schools. These schools, open to qualified children without charge, are either directly or indirectly supported by state tax funds. Most public residential schools are supported by legislative appropriation and hence come under the control of state authorities. The educational services of the remaining schools are purchased by the states on a per diem or per capita basis and are controlled by their own boards.

Other tax-supported institutions for the deaf are public day schools and classes. A day school is usually large enough to be a separate entity. Day classes are usually groups within a larger school unit. About 20 per cent of the deaf children are educated in public day schools. The remaining 5 per cent are in denominational or private schools. The latter may be either day or residential schools. The number of children in each class ranges generally from 5 to 10. Some deaf children have been absorbed into classes for the hearing. Deaf persons attend high schools and colleges for the hearing. Most public residential schools provide education at the secondary level, and education at a higher level exclusively for the deaf is available at Gallaudet College, Washington, D. C.

For deaf children, special technics are necessary to build the skills of communication. Speech must be learned from the beginning by a multisensory approach that uses vision and touch primarily. Auditory training through powerful hearing aids supplements the other sensory experiences to improve the child's own speech and his perception of speech. Lip reading, in the oral method of instruction, becomes the chief way of understanding spoken words.

One of the most formidable tasks in the education of deaf persons is development of the understanding and expression of language. The magnitude of this problem is not as great for hard-of-hearing persons because they have at least partial auditory verbal reinforcement of their reception of language. It is through the ear that we first learn language. By ingenious technics, teachers of the deaf develop language in deaf children despite deprivation of their adequate use of the sensory channel considered essential for its growth. They have learned to cope with the problems presented by needs for vocabulary, multiple meanings, verbalization of abstractions, and complexity of structure.

Vocational and psychologic guidance for deaf adults—My statements on vocational and psychologic guidance of hard-of-hearing adults apply in general to deaf adults also. A deaf

adult may differ from his deaf acquaintance as much as or less than he does from his hearing friend. It would be desirable if those who counsel deaf persons who cannot speak or read lips were familiar with the manual alphabet and the language of signs. Studies are under way by the National Association of the Deaf to explore the occupational activities and the problems of psychologic adjustment of deaf adults. In general, society now understands that the deaf not only can be educated but also can, with proper guidance and opportunity, become economically and socially productive. Their accomplishments in industry, the arts, certain professions and in community activities attest to this.

Organizations for the Deaf and Hard of Hearing

Responsible for the increasingly encouraging outlook for deaf and hard-of-hearing persons are a number of organized groups and agencies that have an interest in problems presented by impaired hearing.

1. The Alexander Graham Bell Association for the Deaf. Dedicated to the promotion of teaching speech to deaf children and to the operation of the Volta Bureau, established to disseminate information about deafness and the deaf, especially to parents, to schools and to allied professions. The Association publishes the *Volta Review*. 1537 35th Street, N.W., Washington 7, D. C.

2. American Academy of Ophthalmology and Otolaryngology. The chief organization of certified otolaryngologists. Through its Committee on Conservation of Hearing it sponsors public information and research activities on noise in industry and on hearing in children and in adults. The Academy publishes transactions of its annual meetings and other material that relates to the achievement of its purposes. 100 First Avenue Building, Rochester, Minnesota.

3. American Hearing Society. Organized on an affiliate basis in most of the cities in the United States, the Society's stated purpose is to "serve as an information center on problems of defective hearing, to improve educational, economic and social conditions among both adults and children whose hearing is impaired; and to stimulate scientific efforts in the prevention of deafness and the conservation of hearing." The Society publishes *Hearing News*. 1800 H Street, N.W., Washington 6, D. C.

4. American Otological Society. This is the senior society of American and Canadian otologists. It finances a research bureau whose chief interest is the investigation of otosclerosis. The Society publishes transactions of its annual meetings. At the time of this writing, the address is: c/o Dr. Dean Lierle, State University of Iowa, Iowa City, Iowa.

5. American Speech and Hearing Association. A professional and scientific association composed primarily of speech and hearing therapists and investigators working in universities, schools and hospitals. The Association publishes *The Journal of Speech and Hearing Disorders* and other supplementary material. Its directory is helpful in guiding physicians in referrals to qualified therapists. The Secretary-Treasurer is located at Wayne University, Detroit, Michigan.

6. Conference of Executives of American Schools for the Deaf. Composed of executive officers of public residential schools and larger day and private schools for the deaf. Its stated purpose is "to promote the management and operation of schools for the deaf along the broadest and most efficient lines and to further and promote the general welfare of the deaf." The Conference publishes *The American Annals of the Deaf* and other supplementary material. It can be reached at Gallaudet College, Washington 2, D. C.

7. Convention of American Instructors of the Deaf. Composed of teachers of the deaf who, unlike members of the Alexander Graham Bell Association, may or may not be committed to the oral instruction of the deaf. The Convention publishes the proceedings of its biannual meetings and its official organ is *The American Annals of the Deaf*. It can be reached at Gallaudet College, Washington 2, D. C.

8. National Association of the Deaf. Composed of deaf adults whose purpose is "mutual assistance and encouragement in bettering their standing in society at large, and the enjoyment of social pleasure attendant upon the periodical reunion of a widely scattered class of people." The Association has been active in eliminating barriers to employment for the deaf and in promoting an understanding by the general public of the value of the language of signs for the deaf. The Association publishes the *Silent World*. 2495 Shattuck Avenue, Berkeley 4, California.

9. National Fraternal Society of the Deaf. Organized to provide fraternal-type benefits for the deaf, particularly insurance, since in some fraternal contexts the deaf are classified as undesirable risks. The Society publishes the *Frat*. 433 Oak Park Avenue, Oak Park, Illinois.

In addition to these organized groups, agencies of the government also have been active in the field of impaired hearing. The more significant among these agencies are the following:

1. Armed Forces National Research Committee on Hearing and Bio-Acoustics (CHABA). Organized through a contract between the Department of Defense and the Central Institute for the Deaf to furnish consulting service to the Department on problems related to hearing and deafness. Experts throughout the country are available to the Committee, which publishes reports from time to time. The secretariat is located at Central Institute for the Deaf, 818 South Kingshighway, St. Louis 10, Missouri.

2. National Institutes of Health (Department of Health, Education and Welfare). Through its National Institute

on Neurological Diseases and Blindness the NIH furnish funds for research and training purposes related to hearing impairment. Bethesda, Maryland.

3. Office of Education (Department of Health, Education and Welfare). This office gathers statistics about handicapped children and promotes studies about them. Among the recent studies of interest to us are studies of the competencies needed for teachers of the deaf and of the hard of hearing. Washington 25, D. C.

4. Office of Vocational Rehabilitation (Department of Health, Education and Welfare). This office is interested in promoting and upgrading the employability of the deaf and hard of hearing through grants for research, for rehabilitation and for the training of professional personnel. Washington 25, D. C.

Summary

Factors responsible for increased interest in hearing impairment are cited. The nature of hearing impairment as it relates to both education and rehabilitation is clarified, and acceptable educational and rehabilitative measures for the deaf and hard-of-hearing are described. Organizations and agencies active in the field of hearing impairment are listed.

Conclusion

I cannot improve on a previous contribution[28] as an appropriate conclusion to this discussion.

"Although man has traveled a long tortuous road from the pre-Christian era in evolving an enlightened understanding of the social problems of deafness, a large portion of society still looks upon the deaf and hard of hearing as queer, dependent, and, sometimes, ridiculous. We are all familiar with the cheap humor of which they are often the target. Since their handicap is not as visible as that of the blind and the crippled, the deaf often find themselves in embarrassing and humiliating situations because others do not understand their special problems.

"The answer of the deaf to such misunderstanding is to continue their social and economic achievements as self-respecting and productive individuals. Our social action for the deaf, therefore, should not aim for special privileges for them, but should constantly strive to provide opportunity without discrimination for the deaf to help themselves.

"The achievements of the deaf in the United States since the founding of the first school for the deaf in Hartford in 1817 have been good, but the record can be improved. This is the conjoint task of the teacher, the parent, the scientist, the clinician, the social planner and, of course, the deaf person himself."

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POSTGRADUATE MEDICAL DEBATE

Esophageal Hiatal Hernia

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DONALD B. EFFLER†: Surgical Management

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Statement by Dr. Andersen:

ONE of the most common abnormalities affecting the esophagus and stomach is the esophageal hiatal hernia. The frequency with which it is encountered may vary according to the diligence of the search, but careful roentgenologic investigation of the esophagus and stomach will demonstrate such a hernia in 8 to 10 per cent of patients who undergo such an examination. The abnormality is found with greatest frequency among patients who are overweight and who are between 40 and 70 years of age.

Diagnosis

Because determination of treatment partially depends on the degree and type of difficulty which are presented by the patient, a brief review of the symptoms and diagnostic methods is advisable.

HOWARD A. ANDERSEN

Many esophageal hiatal hernias are asymptomatic, and are discovered accidentally during roentgenoscopy. Whenever the esophagogastric junction is elevated above the level of the diaphragm, the sphincter mechanism which normally prevents reflux of gastric contents into the esophagus may be lost, resulting in incompetence of this valve. Symptoms such as excessive belching after meals, regurgitation of small amounts of sour or bitter gastric contents after meals or when stooping, and substernal burning between meals or nocturnally suggest an incompetent cardia with reflux of gastric contents into the esophagus. Esophagitis may ensue; if it does, it may produce symptoms difficult to distinguish from

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those produced by peptic ulcer of the stomach or duodenum.

A mechanical type of distress, with epigastric and substernal aching or a squeezing type of pain, is common. This difficulty may occur after meals or during stooping or physical exertion. It may be relieved simply by the resumption of an erect posture, by hyperextension of the body, as when stretching, or by cessation of physical exertion. Hence, there may be difficulty in distinguishing it from the discomfort associated with myocardial ischemia. Distinction of this pain from that associated with cholecystitis and pancreatic disease similarly may be difficult. Dysphagia caused by esophagospasm or stricture and bleeding from the lower part of the esophagus or gastric pouch, in the form of slow oozing or brisk hemorrhage, are commonly encountered.

Diagnosis usually is made by roentgenologic examination of the esophagus and stomach. Special positioning of the patient, such as forward bending, may be required to demonstrate the pouch of stomach above the level of the diaphragm and incompetence of the cardia. Esophagoscopy may be indicated for demonstration of the hernia when the results of roentgenologic examination are inconclusive, for evaluation of esophageal damage in the presence of a known hiatal hernia, or for exclusion of a malignant process in the cardia or lower part of the esophagus which might mimic a hernia.

There are various types of esophageal hiatal hernias which may be distinguished by roentgenologic examination or esophagoscopy or by combining the information obtained from both procedures. Of many satisfactory classifications one might use the following: (1) the sliding type of hernia, in which the esophagogastric junction is located above the level of the diaphragm, but is capable of extension downward to approximately the level of the esophageal hiatus; (2) the short-esophagus type of hernia, in which the esophagogastric junction is above the diaphragmatic hiatus and cannot be extended downward; and (3) the para-esophageal hiatal hernia, in which the esophagogastric junction has retained its normal diaphragmatic association with a pouch of stomach protruding through the hiatus around or beside the esophagus.

The combination of a sliding hernia with a large para-esophageal component may be present. Sometimes distinction between the sliding and short-esophagus types of hernia is not clear-cut; that is, the esophagogastric junction may be extensible downward a short distance, but cannot regain its normal position in the esophageal hiatus.

Sliding Esophageal Hiatal Hernia

The sliding type of esophageal hiatal hernia is the most common variety and the one most amenable to medical management. Only surgical repair can restore the normal anatomic relationships, but many people can live comfortably with this imperfection. It is reasonable to try a medical program for those patients who have a small or even a moderate-sized hernia and who present few symptoms. It is almost essential to use a medical program for patients who are obese, regardless of the severity of the symptoms. Surgical treatment is almost never urgent when this type of hernia is present because incarceration rarely occurs. Hence, when the differential diagnosis between hiatal hernia and myocardial insufficiency is difficult, operation can be postponed until the problem is clarified. Other factors such as the age, occupation and general condition of the patient also will play a role in the decision.

Conservative management should be directed toward alleviation of the symptoms and prevention of esophageal complications. Reduction of weight to a standard or below-standard value is perhaps the most important single measure, and frequently this alone will be sufficient to eliminate the distress. When symptoms suggest an inflammatory reaction in the esophagus, the incorporation of bland features in a weight-reduction diet is advisable. Antacids should be used prior to the patient's assumption of a recumbent posture in order to minimize the effect of irritating gastric juices on the lower part of the esophagus. Neutralizing agents also may be indicated at other times during the day, depending on the severity and time of onset of the symptoms.

The patient should avoid a horizontal position for long periods because gastric contents are most likely to roll upward into the esophagus. Elevation of the head of the bed 4 to 6 in. helps gastric juices remain in the stomach during sleeping hours. Avoidance of large meals (enforced by a weight-reduction diet) and elimination of any garment or activity which increases intra-abdominal pressure (such as tight belts, girdles or corsets, heavy lifting and so on) may not only decrease gastroesophageal reflux, but will minimize actual protrusion of the stomach upward through the esophageal hiatus.

A person with a duodenal ulcer has already demonstrated an increased susceptibility to peptic digestive activity, and is almost certain to acquire esophagitis when an esophageal hiatal hernia develops. The combination of a duodenal ulcer and an esophageal hiatal hernia in the same person is, therefore, a hazardous one because of the potential danger to the esophagus. Surgical repair of the hernia before the esophagus is permanently damaged may be a wise course, but if medical management is attempted, details of treatment should be emphasized.

When mild superficial esophagitis is visualized esophagoscopically in association with a sliding hernia, medical treatment should be abandoned if symptoms and the inflammatory reaction are not readily eliminated.

Short-Esophagus Type of Hiatal Hernia

In this type of hernia the esophagus is permanently shortened by fibrous scarring. Stricture and esophagitis are present in the majority of cases. Medical treatment is seldom ideal for these patients, but in most instances a trial of medical management is advisable because of the lack of a good, safe and simple surgical procedure which promises a reasonable chance for cure.

Strict attention should be given to all the facets of treatment suggested for a sliding hernia. The patient should observe especially the antacid regimen, and should use a bland diet with the frequent ingestion of neutralizing agents.

Dysphagia frequently is a major problem. It is caused by either stricture or esophagospasm. Esophageal dilations frequently are helpful, but usually need to be repeated. Intervals between dilations vary considerably from patient to patient and from time to time in the same patient. Dilation should be carried to a size sufficient to allow the swallowing of solid foods with ease. In the treatment of adult persons an attempt should be made to reach the size of a 45 or 50 French dilator.

Admittedly, a conservative regimen in this type of hernia is troublesome, annoying, uncomfortable and at times ineffective. Attempts at such treatment are justified, however, because frequently they will be helpful, and because any satisfactory surgical treatment entails a major operation with its associated risk to life. The attempted medical treatment will have lost nothing except time, and can be abandoned by mutual agreement between patient and physician. Furthermore, both the patient and physician will rest more comfortably in the knowledge that an honest effort has been made to avoid surgical intervention.

Para-esophageal Hiatal Hernia

Medical treatment should play no role in the treatment of the para-esophageal form of hiatal hernia. Incarceration or strangulation of the stomach or of other abdominal contents may occur when this type is present. In addition, gastric ulceration, with slow or rapid bleeding, is common. Surgical repair is indicated for all patients whose medical status will permit it.

Summary

Proper management of a patient who has an esophageal hiatal hernia depends on innumerable factors such as the age, sex, occupation and habitus of the patient, type and severity of symptoms, type of hernia, presence or absence of esophageal damage, general state of health and emotional stability of the patient, willingness of the patient to cooperate, and other intangibles. Medical treatment can alleviate the mechanical distress of the hernia by reduction of weight and elimination of any garment or activity which increases

intra-abdominal pressure. Protection of the esophagus or treatment of esophageal inflammatory reactions is accomplished by elevation of the head of the bed whenever the recumbent position is assumed and by measures to neutralize gastric acidity, thereby minimizing the effect of reflux of gastric contents through an incompetent cardia.

Statement by Dr. Effler:

DONALD B. EFFLER

SURGERY offers the only definitive treatment for hiatal hernia. However, the presence of a hiatal hernia is not in itself an indication for operation. Proper selection of patients for surgery should be based on individual evaluation of the patient, the severity of his symptoms, and the presence of complication.

Classification

My experience is based on a series of more than 300 patients who were treated by transthoracic repair of hiatal hernia. In general, two major types of hiatal hernia have been recognized:

1. *Pulsion type*—The hernia is produced by increased intra-abdominal pressure. This includes the so-called para-esophageal hernia.

2. *Traction type*—True shortening of the esophagus occurs and the stomach is drawn upward into the mediastinum. This frequently (and erroneously) is called "congenital short esophagus." Differentiation between these two major types frequently is possible by history and by radiographic examination. Although the cause is different in the two types, both are acquired and both are subject to essentially the same symptoms. Serious complication is likely to occur in the short-esophagus (traction) type—more so than in the pulsion type.

Clinical Features

The symptoms of hiatal hernia are constant, but extremely variable in degree. The most common symptoms are intermittent mild dysphagia, regurgitation during or after meals, pyrosis or heartburn after meals, and pain at night which is relieved by the upright position and the ingestion of alkali. Contrary to a widespread impression, there usually is little correlation between the size of the hernia and the severity of the symptoms. Similarly, the radiologists' oft-spoken observation that a given hernia is incarcerated or reducible again bears little relationship to the symptomatology.

Complications of hiatal hernia must be distinguished from ordinary symptoms, as their presence increases the potential of serious trouble. These complications may be grouped into three categories:

1. *Bleeding*—This may vary in severity from occult to massive hemorrhage, and may be demonstrated by hematemesis, melena or blood-loss anemia.

2. *Peptic ulceration*—This invariably is found in the thoracic stomach and, contrary to common reports, rarely is an isolated finding in the esophagus.

3. *Obstruction*—This may be produced by volvulus of the stomach within the mediastinum; however, the most common form is true stricture formation at the esophagogastric junction.

Selection for Therapy

Every patient with symptomatic hiatal hernia merits some form of therapy. It is unfortunate that understanding of this particular type of coelomic hernia has been clouded by medical concepts that are unsound. Despite the voluminous literature concerning this common entity, the clinical management of hiatal hernia is and should be basically simple. At the risk of oversimplification, it would seem that the responsible clinician has three choices in advising the patient with hiatal hernia.

1. He may tell the patient to ignore it, and to refrain from any form of therapy. In the case of an asymptomatic hiatal hernia that has been detected as an incidental finding only, I believe this is the simplest and most sensible thing to do. As stated before, the presence of the hernia is not an indication for therapy. It is surprising how many patients with hiatal hernia are relatively free of symptoms.

2. He may, in the case of a symptomatic hiatal hernia, elect a long-term medical program with emphasis on diet, supplementary antacids, antispasmodics and attention to posture—particularly after meals. If the patient obtains satisfactory relief and is content to follow such a program, then nothing more need be done. It would seem to me, however, that the conscientious clinician must advise the patient that if the medical program is unrewarding, surgery offers an alternative form of treatment. This should be done, as many of the patients grow tired of the long-term therapy or become dissatisfied with the results. A significant percentage of such patients become drugstore habitués and advocates of self-treatment with proprietary medications. Often such patients are unaware that corrective surgery may offer complete and lasting relief of the symptoms of hiatal hernia.

3. He should consider surgical therapy for every patient with hiatal hernia who has shown poor response to medical therapy or who has demonstrated a recognized complication. Once bleeding or ulceration has been demonstrated, it becomes quite unlikely that the patient ever will obtain more than transient relief from the most stringent medical program. When stricture formation is present, the medical program must be supplemented by periodic bougienage that rarely is curative in this disease. The importance of recognizing complications and distinguishing them from the common symptoms of hiatal hernia becomes more apparent when the clinician and surgeon establish sensible criteria for surgical intervention. Failure to differentiate between symptoms and complication, and the frequent tendency to minimize the patient's own evaluation of his disease, will lead to a superficial understanding of the problem and a disservice to the patient.

In summary, the indications for surgical correction of hiatal hernia are based on the following observations: (1) The asymptomatic hernia does not require treatment. (2) The size of the hernia is of secondary importance. (3) The ordinary symptoms must be carefully differentiated from real complications. (4) Surgery should be advised when (a) the symptomatic hernia does not respond to a well-planned medical program and when (b) one or more complications have been observed.

Surgery

The surgical treatment of hiatal hernia must employ the same fundamentals that are basic for all types of hernias in the coelomic cavity. Whereas many details have been suggested, the fundamentals remain constant. Any operation that follows each of these fundamentals will have a good chance of accomplishing its purpose. Applying the basic lessons that have been learned in the surgical treatment of inguinal hernia, these fundamentals include: (1) careful dissection and exposure of the anatomic features related to the hernia, (2) removal of the hernial sac, and (3) proper reconstruction of the hernial site with due regard to the anatomic and physiologic features of these structures.

In operations for hiatal hernia, the transthoracic approach has enjoyed great popularity, as it allows excellent visualization of the essential structures, and permits correction of hernias regardless of the type and esophageal length. The argument of surgical approach—whether through the abdominal or the thoracic wall—is less important than the surgeon's mission, which is complete and permanent reduction of the stomach below the diaphragm. Variations in technical details are to be expected; however, there should be no variation in the fundamentals of hernial repair. With proper selection of patients, the results should be uniformly excellent; the mortality rate should be less than from 1 to 2 per cent, and the recurrence rate approximately the same. When the operation is well conceived and the patient is carefully selected, the prognosis for relief of symptoms and complication is excellent, and the need for continued medical therapy no longer exists.

Comment by Dr. Andersen:

The presentation by Dr. Effler is clear and concise. It contains little to provoke argument. One cannot disagree with the principles of surgery which he has enumerated.

He has distinguished two types of hernia.

but he has made no distinction between the two in discussing surgical treatment. In my opinion, shortening of the esophagus entails a problem to the surgeon, because the situation then becomes entirely different from the esophagus of normal length. Because the esophagus is shortened, "proper reconstruction of the hernial site" cannot be accomplished by replacement of the esophagogastric junction into its normal position at or below the diaphragmatic hiatus. Attempts to pull the esophagogastric junction downward leave the esophagus under tension, with a great likelihood of recurrence of the hernia. Frequently, excisional surgery is necessary to eliminate esophagitis and stricture and to minimize the possibility of recurrence of these complications. This type of operation imposes a greater risk to the patient than does the simpler repair of the hernia.

Even when the short-esophagus type of hernia is excluded from surgical reports, rates of recurrence after repair of the pulsion or sliding type of hernia vary from 3 to 50 per cent, with an average of approximately 10 to 12 per cent. Furthermore, all patients do not obtain relief from symptoms of reflux through the esophagogastric junction, even though the surgeon has accomplished a good anatomic result.

I wish to reiterate, as Dr. Effler has emphasized, the fact that the surgeon can be of great help in properly selected cases. However, the majority of patients who have an esophageal hiatal hernia can live comfortably with this anatomic imperfection by attention to a few details of medical management.

Comment by Dr. Effler:

I am somewhat disappointed in Dr. Andersen's presentation, as I find little to refute. Whereas our ideas may differ in detail, I believe that we are in fundamental agreement.

Dr. Andersen repeatedly emphasizes the importance of esophagitis in symptomatic hiatal hernia. When present, this is a troublesome component of the disease. In our operative series of more than 300 patients, we found esophagitis to be of organic significance in a relatively small percentage of cases. It usually is associated with the traction or short-esophagus type of hernia. When proper surgical repair is instituted in esophagitis, there will be an interval of time before the secondary inflammation subsides. Continued medical therapy during this period will be beneficial, and it is not unusual for a few dilations to be indicated.

In essence, Dr. Andersen and I employ the same philosophy in the selection of therapy for hiatal hernia. Perhaps this attitude can be summarized by the following statements:

1. Many patients with hiatal hernia require no treatment.

2. There is a place for long-term medical therapy in the treatment of hiatal hernia. When such therapy is recommended as the course of election, the patient should be told that this program is not curative, as the basic problem is related to anatomic abnormality.

3. A safe operative procedure is available in the event of complications, or if the medical program should prove to be burdensome or unsatisfactory.

CLINICOPATHOLOGIC CONFERENCE

Report From Veterans Administration Hospital, Hines, Illinois

Report of Case

A 45 year old white man was first admitted to Hines Veterans Administration Hospital on August 22, 1955, with an 18 month history of progressive shortness of breath, which became noticeably worse a few weeks prior to admission. He stated that he had only occasional cough with expectoration of a grayish sputum. He complained of dyspnea after climbing one flight of stairs or walking one block. He used two pillows at night but had no paroxysmal nocturnal dyspnea. His appetite decreased during the few months before admission, and he had a weight loss of 10 lb. He did not complain of nausea, vomiting, diarrhea, constipation, melena, jaundice or abdominal discomfort. The patient's occupation was that of a molder, and his past history revealed that for 14.5 years he worked for an asbestos company, leaving in 1953. There, he dealt directly with products containing asbestos, and he claimed that he had worn a protective mask during that time.

On admission, the patient's temperature was 98.8° F., pulse regular at 100, respirations 24, and blood pressure 120/94. He was in no acute distress but was mildly dyspneic. His nose, cheeks and neck were mildly cyanotic, and his fingernail and toenail beds were moderately cyanotic. His skin color was slightly yellow and the sclerae were icteric. There was slight increase in the anteroposterior diameter with rounding of the upper anterior area of the chest. There was diminished expansion bilaterally and use of the accessory muscles in respiration to a moderate degree. A few inspiratory wheezes were present bilaterally, and fine crackling rales were heard at both bases posteriorly. The left heart border was at the midclavicular line, but the point of maximal impulse (P.M.I.) was seen in the fourth interspace 8 cm. from the midsternal line. No murmur was heard, but a gallop rhythm was present. The P_2 sound was louder and greater than the A_2 sound. There was 1+ neck vein distention when the patient was supine, but the hepatojugular reflex was absent.

Marked clubbing of the fingers and toes was observed.

Laboratory data—X-ray of the chest showed fine linear, dense shadows extending from the hili into the outer third of both lungs, with special localization in the lower lobes. This was interpreted as being consistent with the diagnosis of asbestosis. X-rays of the fingers and toes revealed osteoarthropathy. An electrocardiogram was abnormal and summarized as showing right-sided heart strain and first degree atrioventricular block. Venous pressure was 120 mm. of water and a sodium dehydrocholate time was 45 seconds. Two days later the latter was recorded as 30 seconds. Urinalysis performed on admission revealed 1+ albuminuria and 10 white blood cells per high-power field. Serologic study was negative. A two hour Watson test revealed 0.3 mg. of urobilinogen excreted in two hours. Admission hemogram showed 5.15 million red blood cells, 15.5 gm. hemoglobin and essentially normal white blood cell count and differential. Red blood cell fragility test showed initial hemolysis at 0.48 per cent sodium chloride with complete hemolysis at 0.38 per cent sodium chloride. Coombs' test was negative. The van den Bergh test was 0.7 direct and 1.7 indirect. Cephalin-cholesterol flocculation was 1+. Nonprotein nitrogen readings were 45 and 32 mg. per cent. Total protein was 8.3 with 4.6 albumin; sodium and potassium were normal. Sputum specimen culture showed *Neisseria catarrhalis* and alpha hemolytic streptococci. Skin tests for tuberculin, blastomycin, coccidioidin and histoplasmin were negative. Prothrombin time was 14 seconds, 57 per cent. Bleeding and coagulation times were normal.

Hospital course—The patient's general status during his hospitalization did not change. He was studied thoroughly to find the etiologic basis for his pulmonary disease. Cardiac catheterization, performed September 14, 1955, indicated a normal pulmonary wedge pressure, a superior vena caval pressure of 7 mm. mercury, right ventricular pressure of approximately 70/16 mm. of mercury, and right atrial pressure of approximately 15 mm. of mercury. Oxygen saturation of the brachial artery was 82.1 per cent at rest and increased slightly to 82.9 per cent after exercise. These findings suggested that the patient had borderline elevations of the pressures in his right ventricle, right atrium and right superior vena cava. There was no clinical evidence, however, to suggest congestive failure.

As the patient did not desaturate following exercise, the possibility of a capillary alveolar block was not entertained. Pulmonary function studies in this patient revealed a vital capacity of 1.93 l. and a maximal breathing capacity of 81.3 l. per minute.

Because a diagnosis could not be made from the laboratory findings, the patient was transferred to surgery for a lung biopsy on September 23, 1955. A biopsy specimen taken on that day under local anesthesia by means of a right thoracotomy revealed the presence of asbestosis as diagnosed histologically. The patient tolerated the procedure very well and was transferred back to the medical service on September 28, 1955. At that time he appeared relatively asymptomatic except for the persistence of his primary complaint of exertional dyspnea. He was discharged October 10, 1955, without recall.

He was again admitted to this hospital on February 21, 1956, with a two month history of intermittent edema of the ankles, especially severe in the two weeks before admission. His local physician stated that the patient was being maintained on digitalis. He had a one month history of restlessness but no frank paroxysmal nocturnal dyspnea until the night prior to admission when he sat up all night very short of breath. He was seen by his local physician and given a hypodermic injection, after which he came to the hospital.

Physical examination at the time of admission found him to be cyanotic, diaphoretic, apprehensive and quite dyspneic. His temperature on admission was 102.4° F. rectally, pulse 150 and regular, blood pressure 130/100, and respirations 60 per minute. Respirations were symmetric, shallow and quite rapid. Auscultation revealed moist and crepitant rales in both bases as well as pronounced friction rub on the left. The left heart border was not percussed satisfactorily. How-

ever, the P.M.I. was diffuse and 2 to 3 cm. lateral to the left midclavicular line. No thrills or murmurs were heard or palpated. There was 2 + pitting edema in both lower extremities. The pulses were palpable bilaterally.

Approximately four hours after the initial dose of digitalis a repeat electrocardiogram was taken which showed digitalis effect. However, the evidence of failure was still present, namely, rales in both bases as well as peripheral edema. The heart rate had not slowed. He was given oxygen by nasal tube. When examined later the day he was admitted, he was found to have marked distention of the cervical veins, and a phlebotomy was performed to remove 200 cc. of blood. Within an hour the patient looked worse, had an apical rate of 130, and his blood pressure was unobtainable. Intensive medical therapy was instituted. His blood pressure stabilized at approximately 140/100 and continued that way the rest of the night. On the following day the patient's condition was about the same. He died later on the day following admission.

Discussion

DR. ROBERT W. CARTON (internal medicine, University of Illinois College of Medicine, Presbyterian Hospital, Chicago State Tuberculosis Sanitarium): This afternoon we have a case which I am going to discuss in a fairly straightforward fashion. Being naïve, I believe this is not a particularly intricate situation, although it is a most interesting one.

The case is that of a 45 year old man who was first admitted to Hines Hospital in August 1955. He complained of shortness of breath, cough and loss of weight. There was little else, except for the most revealing finding that he had been a worker for 14.5 years in an asbestos plant in contact with asbestos dust. The length of exposure and the nature of his work are such that a pneumoconiosis must be considered in the diagnosis.

On admission to the hospital it was noticed that he was slightly cyanotic, that the anteroposterior diameter of his chest was slightly increased, and that a few inspiratory wheezes were present at the bases of the lungs. These findings, along with clubbing of the fingers and toes, are compatible with a variety of chronic lung diseases, but they do not point specifically to any one.

FIGURE 1. Posteroanterior x-ray of the chest showing linear markings and nodular particles in the lower lung fields.

The admission chest x-ray showed linear shadows extending out from the hili, with special localization to the lower lobes. Could we see that chest x-ray now?

DR. DONALD KILLELEA (radiologist): This is a posteroanterior film (figure 1) showing a linear, finely nodular infiltrate in the bases of both lung fields.

DR. CARTON: Do you see any evidence of pleural thickening or of pleural involvement on that x-ray? That's hard to tell, I know, because it is easily confused with parenchymal involvement.

DR. KILLELEA: There is a little blunting of the costophrenic angles. They are not as sharp as would usually be true. There could be pleural thickening there. There is a little thickening on the right.

DR. CARTON: The apical caps are not particularly thickened. There is no evidence of tuberculosis.

You spoke of nodularity. I do not see an appearance such as nodular, second-stage silicosis, in which one has large numbers of

rather fine nodules scattered through the mid-lung fields. Would you comment on that point?

DR. KILLELEA: They are very fine. It is predominantly a linear component, but I believe if you look closely you will see nodules.

DR. CARTON: The fibrosis or the increase in density is predominantly located in the lower lung fields.

We have, therefore, an individual described to us who (1) complained chiefly of shortness of breath, (2) had had a prolonged exposure to asbestos, (3) exhibited rather indeterminate physical findings in the chest, and (4) presented with a chest x-ray compatible with asbestosis. This combination of suitable industrial history, evidence of disability, and diagnostically abnormal chest x-ray fulfills the requirements of most industrial commissions for a compensable pneumoconiosis, and I think that we, too, should accept this verdict. It was affirmed by a lung biopsy, which showed asbestos bodies.

Was asbestosis alone responsible for his death? An electrocardiogram on admission revealed "right heart strain"; the venous pressure was 120 mm. of water; and the circulation of blood from the arm to the tongue was slowed to 45 seconds. One suspects disease of the right heart. On September 14, 1955, cardiac catheterization was performed. The pressure in the superior vena cava was 7 mm. of mercury. As those two values are usually identical, barring some obstruction between the superior vena cava and the atrium, I would either have to question the accuracy of the results or postulate a chronic constrictive pericarditis. The pressure in the right ventricle, 70/16 mm. of mercury, was very considerably increased above the normal, and no pulmonary artery pressure was given. In view of these findings, and because the pressure recorded from a catheter wedged in the branches of the pulmonary artery was normal, it seems evident that the left heart was uninvolved, and that the hypertension in the right ventricle reflected some obstruction imposed between it and the left atrium. This obstruction was the rigid fibrosed lung of asbestosis.

There is one more point that startles me. The oxygen saturation was equally reduced both at rest and after exercise. The patient may have had an alveolocapillary block in the face of this observation. Such a block has been found repeatedly in cases of asbestosis.

Pulmonary function tests showed a restriction in breathing. The vital capacity was reduced to 1.93 l., while the maximal breathing capacity was better preserved.

The patient returned on February 21, 1956, when he was shown to have findings that were highly suggestive of heart-failure: ankle edema, restlessness and nocturnal dyspnea. In the succeeding history one is struck by the progression: asbestosis to pulmonary hypertension to right heart-failure to death.

There are several aspects of the case which do not fit the usual picture of asbestosis. Clubbing of the fingers, which was present in this man, is unusual, and one might suspect a concomitant bronchiectasis or bronchogenic carcinoma. Secondly, no mention has been made of the finding of asbestos bodies in the sputum. These latter, of course, may be found not only on the examination of sputum from persons with clinical asbestosis, but also in the sputum of persons who have had minor contact with asbestos fibers without suffering clinically from the disease. Were such bodies found in his sputum?

DR. M. E. RUBNITZ (chief, pathology): They were recovered.

Before Dr. Carton goes on with his discussion of this condition, I will present the pathologic findings and he will then continue.

The autopsy findings that are pertinent to this case had mainly to do with the heart, the lungs and a few of the other viscera. The pleural cavities were practically obliterated, with adhesions throughout. Very little of the pleural surfaces was found to be normal.

DR. CARTON: Would you tell me something about the consistency of the lungs? Were they normal, emphysematous, or did they seem fibrosed?

DR. RUBNITZ: The lungs showed a peculiar steely, bluish-gray appearance and a cut section of the lung presented a glistening sheen. The lungs were somewhat enlarged, the left weighing about 800 gm., the right about 950 or 1000 gm.

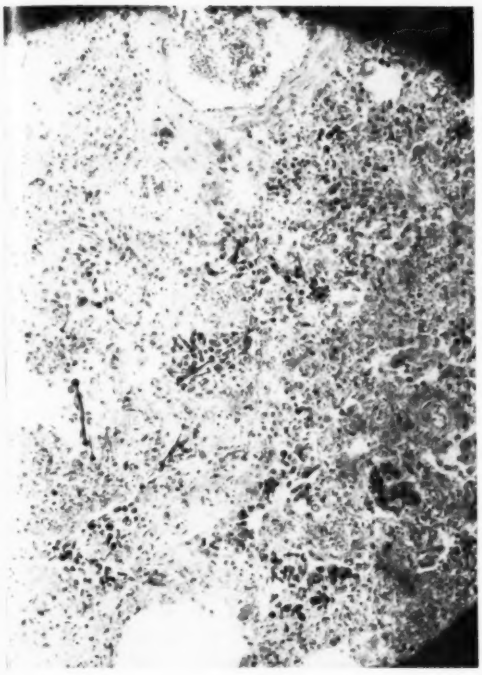

FIGURE 2. Photomicrograph of basal portion of lung. Fibrosis is marked. Asbestos bodies are seen scattered throughout the field.

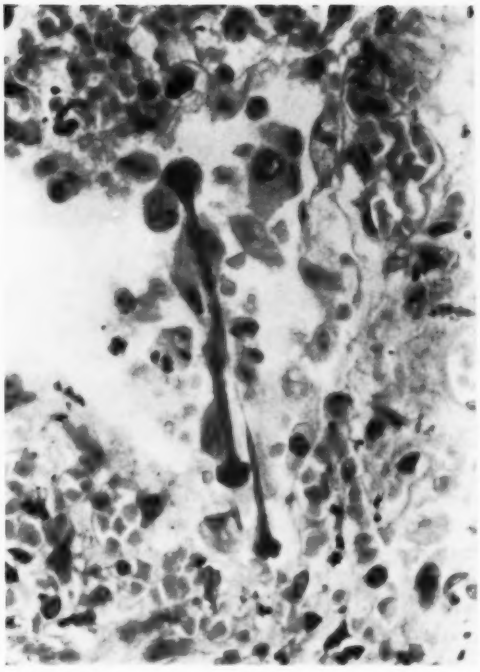

FIGURE 3. A higher power photomicrograph showing the typical asbestos bodies.

Figure 2 is a photomicrograph taken of the basal portion of one of the lungs, showing a marked fibrosis.

Figure 3 shows the typical asbestos bodies, which were easily seen and which had the typical beaded appearance with the bulbous ends. I do not know of any other substance that one might find in the lung that would give this characteristic appearance. Some observers who have described these asbestos bodies state that they do not stain easily with the normal hematoxylin-eosin stain; these did.

The right ventricle of the heart measured about 1 cm. That, as you know, is about two and one-half to three times the normal thickness of the right ventricular wall. The heart itself weighed almost 500 gm. and, again, the most marked features were on the right side, where dilatation and thickening were present. The liver was quite markedly enlarged, weighing about 2,250 gm., and presented the typical nutmeg appearance that one sees in a long-standing chronic passive congestion. The spleen was enlarged, congested and somewhat fibrotic. The spleen weighed about 360 gm., which is two to three times normal size. The kidney showed marked congestion.

DR. CARTON: It now seems to me that we know our diagnosis and want to ask ourselves: (1) What unusual characteristics does this disease asbestosis have? Are they found in this case? (2) How did asbestosis develop in the patient? (3) How may we learn to recognize the condition?

Silicosis, due to inhalation of crystalline silicon dioxide, exists as the *type disease* of the pneumoconioses, and other dust diseases of the lung are considered variants of it. There is no logical reason for this situation, other than the fact that silicosis has been found more commonly and studied more extensively. Most theorists feel that asbestosis results

from the obstruction of respiratory bronchioles and alveolar ducts by asbestos bodies 20 to 250 μ. long, with resulting tiny areas of atelectasis and fibrosis. You have seen beautiful illustrations of asbestos bodies today. These areas are in contrast to the silicotic nodules, which represent the effect on connective tissue of silica dust collected in the lymphatics of the lung.

The pulmonary physiologic changes in asbestosis also differ from those found in cases of silicosis. Let us consider the salient features present in this case of asbestosis. The vital capacity was reduced to 1.93 l., whereas the maximal breathing capacity was more nearly normal at 81 l. per minute. This is the picture of the "tight" lung, which has been noted previously in cases of asbestosis. The arterial oxygen saturation was reduced both at rest and after exercise. Unfortunately, we do not have measurements of the gradient between oxygen tension in the alveolus and that in the pulmonary capillary blood, but in the absence of an obvious gross shunt I conjecture that we have here an increase in this gradient and an alveolocapillary block. This phenomenon also occurs in asbestosis. Note the contrast between these findings and the emphysema and fibrosis of advanced silicosis, in which a low maximal breathing capacity is typical.

There is no evidence here of a bronchogenic carcinoma. Most people at the present time believe that there is a distinct tendency, averaging about 14 per cent, for persons with asbestosis to develop bronchogenic carcinoma. No such tendency is seen in silicosis.

On the other hand, tuberculosis has not been a complication of the recorded cases of asbestosis, as it has been of silicosis.

DR. WILLIAM J. GILLESBY (assistant chief, surgical service): What part might piezoelectricity play in the pathogenesis of silicosis?

DR. CARTON: Quartz dust has been thought to use piezoelectricity (electric forces produced as a result of deformation of crystal structure) to damage tissue. The fibrous crystalline silicates, such as asbestos, have quite a different structure, and, as far as I know, piezoelectricity has not been thought to develop from asbestos bodies. Asbestos must produce a chemical effect on tissue in addition to the mere obstruction of bronchioles, but the nature of this effect is unknown.

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THE APPRAISAL OF APPLICANTS TO MEDICAL SCHOOLS

THE Fourth Teaching Institute of the Association of American Medical Colleges, held in November 1956, was devoted to the appraisal of applicants to medical schools. The proceedings of that session have been edited by Helen Hofer Gee and John T. Cowles and have become available as Part 2 of the *Journal of Medical Education* for October 1957. In the preface, Dr. George Packer Berry, dean of Harvard Medical School and chairman of the Committee on Educational Research and Services of the Association of American Medical Colleges, offers a summary of the proceedings with a few personal comments.

The purpose of selection of students obviously is to choose those who not only can but will seek high goals and reach them. The choice of students who have the capacity to work persistently as well as the possession of superior intellect is a challenge to all admissions committees.

In the institute, representatives of 98 medical schools participated as well as a considerable number of psychologists. Medicine no longer stands first in attracting the most intelligent members of college classes. Dr. Berry emphasizes that society must learn to foster individuality, to accept egocentricity, and to resist pressures leading to conformity. In the selection of medical students, more attention must obviously be given to nonintellectual characteristics as well as to the standardized methods of choice. Admissions committees seem to attach greater importance to the overall grades of applicants than to any other single factor. Letters of recommendation from friends, neighbors or others are given rather limited attention; most attention seems to be on letters from undergraduate faculty members with whom the student has had contact.

One session of the institute was devoted to the status of the interview as an aid in selecting applicants. Repeatedly participants denied any validity to the interview. Few participants argued that the interview should be abandoned, but the emphasis was placed on its value for verifying and clarifying information, for detecting gross deficiencies in emotional

stability and for promoting good public relations between admissions committees, students, members of the family, and others rather than as a means for detecting students who would do best and provide most in their medical education and subsequent practice.

Psychologic testing still is under evaluation and experimentation. "The strength and deficiencies of psychological tests, as well as the complexity of experimentation in this young science, were carefully and skillfully explained by the psychologists." Many new technics are being used. The Rorschach, the thematic apperception and the draw-a-man tests as well as the Minnesota personality test received evaluation. A standard test is the Medical College Admission Test, and recognition was given to the extent to which emotional factors may play a role in the student's performance.

Interesting was the consideration of the role played by skill in communication in academic performance. Many students are unable to express themselves well in writing when they enter college and, as a result, their academic records suffer. Premedical students were usually weak in writing skills. However, a study made in a college of liberal arts also showed little improvement in the writing and speaking skills of liberal arts students after three years of college. The importance of the ability to communicate in modern medicine is so great that educators would do well to determine, if possible, why education in these fields has failed and how it can be improved.

In rating subjects important in premedical education, admissions committees placed most emphasis on physics, then chemistry, mathematics, the humanities and medical sciences and foreign languages.

Among the qualities especially sought in medical students were character, integrity, qualities of leadership, and sincerity of motivation. Great difficulty adheres to determining just why a student decides to study medicine and the factors that determine his choice. Many irrelevancies are developed in studying motivation and nothing conclusive can be drawn from the considerations that have been given to the subject.

Of special significance was a discussion by Professor E. Lowell Kelly of the department of psychology at the University of Michigan of the multiple criteria of medical education and implications for selection. Two classes in the University of Michigan were studied. The members of the class of 1952 tested as seniors were evaluated in 1957, five years after they had received the degree of doctor of medicine; members of the class of 1956 were tested as applicants in 1952 and have been followed for five years. Professor Kelly emphasizes the importance of determining just what type of student is to be selected for what position in society. Out of this scientific study he made some of the most serious criticisms that have yet been offered.

Professor Kelly says that he has been shaken in his concepts of the idealized image of a young physician. He used to think that most physicians were devoted to service and were primarily interested in taking care of the sick, doing good, and helping out in community services. He is now convinced of the truth of unpleasant accusations of recent medical school graduates—for instance, that they are unwilling to make house calls at night, that they think they ought to make two or three times as much money as the students who did not go to medical school, and all of this without taking on greater responsibility to society than anyone else. He finds that medical students are persons who would be planning to be manufacturers, big business men, production managers or engineers if they were not becoming physicians. They are not the kind of people, he says, who would become teachers, ministers, social workers or members of professions interested in doing something for the good of mankind. Indeed he finds that medical students make high ratings on the aviator scale. In common with aviators, they have maleness and a lack of interest in anything cultural. Professor Kelly is careful to say that he is talking about the modal of young men going to one medical school—namely, Michigan—but he strongly suspects that Michigan students are not atypical. Then come his severe conclusions:

"These are hard words. As I see it, medi-

c l practice today, as characterized by the p ople going into it, is the last stronghold of i dividual economic competition, a stage th rough which big industry has already passed. It is my impression that the typical young executive in big industry today has a far greater sense of community needs and sensitivity to his role in helping society solve its problems than does the young physician who is still essentially an entrepreneur. Is this what you want? You are in a unique position; if you dare, you can select the next generation of medical students in a manner which will make the profession conform a little more closely to your ideals of what it should be. For example, our data suggest that if you want to select the kind of a lad who is going to be interested in public health, general practice, and so on, you should pick the person with a high *Strong* score on the Carpenter key. This is a person who has a relatively low upward mobile ambition in our society. If you want to be more certain of your selection, you pick a person who says he is going to earn a good share of his way through medical school; you pick a person who is more like a chemist or a physicist, than like the physicians on whom the *Strong* physician key is based. I am not saying you must do these things, but if you don't you are either shutting your eyes to the availability of such evidence or saying that it is none of your business what the profession becomes.

"Knowledge which enables you to predict the characteristics of the product of your medical schools puts in your hands the power to change the nature of the entire profession. Such power is almost frightening, but refusal to use it may be abdicating responsibility."

Apparently this was the note on which the teaching institute on the appraisal of applicants to medical schools ended.

Certainly this indictment is disturbing. More disturbing is the lack of any evidence that those present endeavored to set forth a different point of view or to defend the choice of young men who are coming into medicine. From my personal contacts with many hundreds, if not thousands, of young men in many parts of the United States, I am convinced that the indictment is unwarranted. Of course there are in every class in every medical school many young men whose primary objective is financial success, but the vast majority go into hospitals where they work for a pittance as interns and residents. They devote many years after graduation to qualification for a specialty and in every city which I have visited in which hospitals are being built, I have found that the doctors themselves are contributing largely from their own funds to aid such construction which is a community project. Moreover, there are in every town, village and city in which I have participated in such work constant evidences of leadership by the medical profession in advancing the care of the sick from social, psychologic, economic and professional points of view.

MORRIS FISHBEIN

THE PLANNING OF INTERNATIONAL MEETINGS

THE world of science is more alert to the value of interchange of knowledge and thought than is any other human interest. Among scientists, those concerned with medicine have been the leaders in arranging for conferences in which dissemination and communication of information can occur without too many restrictions. For a few brief years, the Russians and their satellites abandoned international organizations like WHO and UNESCO, but more recently they have again begun to participate. Under the joint auspices of UNESCO and WHO, a Council for International Organizations of Medical Sciences was established in 1949. This Council has just issued a handbook on planning international meetings.*

The handbook discusses the aims of conferences of various types. Then detailed analysis and information concerning large and smaller international conferences, discussion groups, symposia, seminars and international committees are presented. Seven appendixes deal with forms to be used for various functions such as

*Published simultaneously in England, Blackwell Scientific Publications, Oxford; France, Masson et Cie., Paris; Canada, Ryerson Press, Toronto; and the United States, Charles C Thomas, Springfield, Illinois.

hotel reservations, lectures, films, exhibits, guides for publication, and guidance for contributors. The material in this handbook has been so thoroughly weighed and sifted that its conciseness inhibits further condensation or abstracting. Here and there in its content, however, are a few sentences of special perception that invite quotation.

Under "The aims of the participants," for example, is this nugget:

> Another important objective, though this is commonly a thorn in the flesh of the organizers, is that of the tourist: the person who attends a conference because he wishes to travel, for whom the conference forms an excuse that may satisfy employers, help with tax relief or, frequently, be a solace to the participant's own conscience.

Among the disadvantages of large congresses are their immense cost and the dangers of resolutions and decisions passed in waves of emotionality, which are recollected with embarrassment many months or years later. "Nowadays no large international conference should be contemplated," suggests this section, "unless really efficient simultaneous interpretation is available." The participants who indulge in inconsiderate behavior, who insist on participation in discussions primarily to show themselves, and who seldom get nearer the meeting than an adjacent lounge or bar come in for mild castigation.

The effect of American leadership in international meetings is apparent in considerations given to panel discussions, "brain trusts" and "buzz groups." These terms must have induced eyebrow lifting in the Oxford editors; they contrast startlingly with a paragraph on "stewards," who would be known in the United States as "ushers." Especially to be commended is the section dealing with the press where "handouts," which is another Americanism, are mentioned.

The aphorisms in the general discussions are abundant, and here also a few quotations merit repetition:

> Commonly, people who are academically first-class are but indifferent speakers and have a poor delivery.

> It is a matter of self-discipline that speakers should use the language in which they are most competent, and this consideration should override all others.

> One does not wish to be too pessimistic about the problem of communicating with delegates, but it does seem to be the experience that whatever arrangements are made for messages a significant proportion of participants will never call at a message desk, look at a notice board, or listen to the public address system.

While modesty is a most commendable virtue, this handbook suffers from lack of any indication as to the person or members of the committee who compiled and wrote it. He or they have rendered a valuable service and the handbook is unique in its field. The best manifestation of gratitude by the medical profession would be for all those who participate in international gatherings to purchase copies and to familiarize themselves with its content.

MORRIS FISHBEIN

KENNY INSTITUTE CLEFT PALATE CLINIC

With the changing scene concerning poliomyelitis in the United States comes an announcement that the Elizabeth Kenny Institute Rehabilitation Center in Minneapolis will open a cleft palate clinic to provide consultation and diagnostic services for persons with this condition. The clinic is made possible through a grant by the Kenny Foundation. A staff is being developed which is composed of specially qualified personnel involved in rehabilitation of those with cleft lip or cleft palate.

The clinic was developed with the concept that the physical, mental and social potentials of persons with disorders of formation of the lip and palate are best obtained by bringing to bear such specialists as the pediatricians, plastic surgeons, dentists, orthodontists, prosthodontists, psychologists, speech pathologists, and medical social workers, as well as the otolaryngologists and vocational counselors. Not many institutes of rehabilitation are as fully

qualified as this one will be to approach the difficulty from all the different points of view that are necessary. A complete study of persons with this disability will include cephalograms, intra-oral radiographs, study models, intra-oral and extra-oral photographs, audiograms, speech analysis, and social service aid. Obviously, psychologic and vocational guidance is equally necessary. When, however, all of these disciplines are properly applied and coordinated, people who otherwise would travel through life subjected to numerous indignities and difficulties will find the way somewhat smoothed for them. Obviously, also, the proper study and care for such patients are long-term problems and the Minneapolis institute is dedicated to a program of rehabilitation of this type. The Kenny Institute Cleft Palate Clinic will be administered by Dr. Ralph B. Kersten, who is the coordinator. The institute is located at 1800 Chicago Avenue, Minneapolis, Minnesota, and persons interested may write directly to Dr. Kersten to secure information as to admission and availability of services for any patient.

MORRIS FISHBEIN

EDUCATIONAL ACTIVITIES OF THE NATIONAL FOUNDATION FOR INFANTILE PARALYSIS

Beginning in 1940 the National Foundation for Infantile Paralysis granted $470,000 to the National Research Council for fellowships in neurology, orthopedic surgery, pediatrics and virology. In 1947 and 1948 and thereafter appropriations were made directly by the National Foundation for Infantile Paralysis to provide postdoctoral fellowships for research in these fields and also in epidemiology. In 1951 the program was expanded and predoctoral and postdoctoral fellowships in medicine and related biologic and physical sciences were given to those candidates interested in research and teaching. Fellowships for medical students were approved when the students showed aptitude in research. In 1946, the United States Public Health Service received $228,400 to provide fellowships for training physicians and sanitary engineers in public health and preventive medicine. Study of rehabilitation was especially encouraged by appropriations made to medical students and to physicians who wished to specialize in this field. More recently fellowships have been provided in the management of poliomyelitis, in psychiatry, health education, medical social work, occupational therapy, the social sciences, and in physical therapy for education, for the training of teachers, and for traveling.

Again as methods and technics have advanced, the National Foundation for Infantile Paralysis has provided short-term fellowships for scientific investigators in the principles, technics and application of tissue cultures. The whole program to encourage education has been fundamental in the magnificent results achieved by the National Foundation for Infantile Paralysis, since such great discoveries as the Salk vaccine for the prevention of infantile paralysis, the development of respiratory apparatus, and the establishment of respiratory centers throughout the United States have all involved education of personnel. Indeed the program of the Foundation has achieved such widespread recognition that practically all other foundations in the field of medicine now recognize that the education of personnel, beginning at the lowest levels and proceeding to the highest, is fundamental to gaining control over the diseases concerned.

An analysis of the appropriations made by the National Foundation as shown by its annual reports indicates that probably as much money has been spent on education as has been spent directly on research, and the results of the research, as already mentioned, may be definitely correlated with the encouragement to education.

MORRIS FISHBEIN

THE DOCTOR AS A PATIENT

As the reader roams through various biographies and autobiographies of physicians—a type of literary pleasure highly recommended—he will come upon interesting tales of the illnesses of physicians and their conduct while at home or in the hospital. For instance, in 1927 the great Pavlov had cholecystitis when

he was 78 years old. His wife insisted that the trouble was with his liver and the doctors disagreed. She wrote to a friend, "He will listen to no one and there is no doctor with authority here." Pavlov was alarmed at his loss of weight so he stopped weighing himself. When his wife insisted on her diagnosis he said, "Wife, keep your medical ignorance to yourself." Eventually he was operated on and a gallstone was found. He looked at the stone and explained that its presence proved the body is a machine.

In his recent autobiography, Dr. J. Johnston Abraham tells of several personal experiences. He writes, "I have had two major operations. They taught me much of how a patient feels; and made me, I hope, gentler, more understanding and more considerate of the doubts and fears of others who have been under my care." After he himself had been operated on for appendicitis, he said that he had learned not to handle tissues roughly.

Recently Sir Ernest Kennaway, a most distinguished authority on cancer, died. Just before his death, he contributed to the *British Medical Journal* "Some notes on nursing from a patient's point of view."[1] He had been a patient on eight occasions in six hospitals.

"No one, whether professional or amateur, who looks after a patient in bed ever seems able to understand that things placed for his use on the bedside table—a cup, a book, fruit, a telephone—should not be placed, as they invariably are, opposite his elbow, but about 18 inches further forward, opposite his hand. Again, if a patient is even slightly orthopnoeic he will not be able to sleep lying flat in bed, and requires some amount of slack in the bedclothes to wrap around his shoulders. But his attendant will always aim at folding over the bedclothes neatly at the level appropriate for an empty bed. . . .

"The process of washing a male patient all over daily in bed by a female nurse raises questions which I have never heard even mentioned, but one hopes that nowadays one can discuss this matter without being prosecuted for obscenity. There is, of course, an obvious difference between old and young men in this matter. I have been washed by a Dutch nurse, gently, but thoroughly, as one washes one's own dog, and I have been demurely neglected for long periods. The rational system would seem to be for the nurse to provide a male patient, not unable to use his hands, with facilities for washing his genitalia, and for the man to undertake this duty as a matter of course. But so long as the whole matter is buried in the deadly silence of convention nothing can be done about it. The male patient sometimes wonders what is the practice in the women's wards of the hospitals.

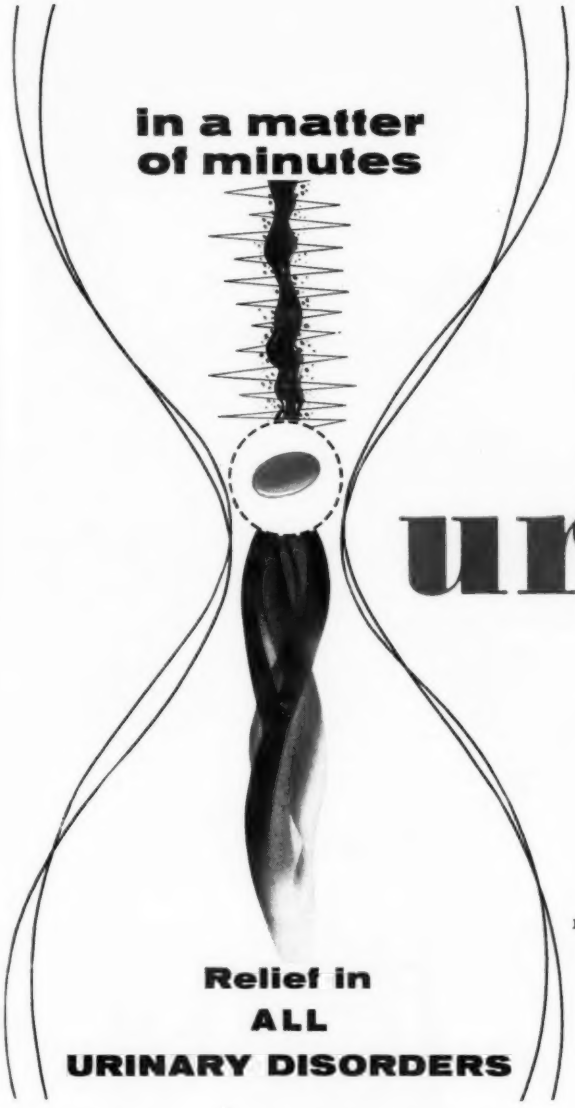
"The present system of medical qualification discharges into the world of general medical practice doctors who have only the vaguest idea of the needs of a patient confined to bed, and of the many conditions which contribute to his welfare and comfort, and hence in many cases to his recovery. Every student of medicine should have some practical knowledge of nursing. . . ."

Modern anesthesia, surgery, and nursing care at their best mean for the patient freedom from pain, considerate attention and maximal opportunity for recovery. But in every type of service the indispensable ingredient is the desire of the people concerned to give the most rather than the least that they can give.

MORRIS FISHBEIN

REFERENCE

1. Kennaway, E.: Some notes on nursing from a patient's point of view. Brit. M. J. 2:1485 (December 21) 1957.



urised®

Attacks the Cause
Alleviates Pain
Arrests Infection

Patients—in all age groups—respond readily to the 3 "A"s of URISED. It is effective in virtually all forms of urinary disturbances—even those complicated by serious systemic disease.[1]

ATTACKS THE CAUSE—In minutes, URISED attacks both primary causes of pain and dysfunction: (1) smooth muscle spasm; (2) incidence of infection.

ALLEVIATES PAIN—Prompt antispasmodic action relaxes painful smooth muscle along the urinary tract, brings quick relief to the distressed patient.

ARRESTS INFECTION—Rapid antibacterial action reduces irritation, even overcomes infections previously resistant to antibiotics and sulfonamides.

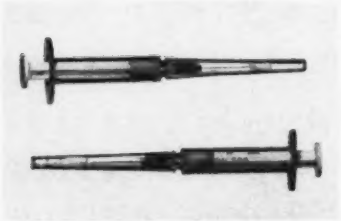
Prescribe URISED with confidence to relieve frequency, burning, urgency, dysuria, promote rapid restoration of normal urinary function in all urinary affections of all age groups. *Usual adult dose: 2 tablets q.i.d.*
Contains: Atropine, hyoscyamine, gelsemium, methenamine, methylene blue, benzoic acid, salol.

1. Strauss, B., Clin. Med., Vol. IV, No. 3, 1957

CHICAGO PHARMACAL COMPANY
Chicago • San Francisco

New *for your armamentarium*

Information published in this department is supplied by the manufacturers of the products described.



• STERILE DISPOSABLE SYRINGES

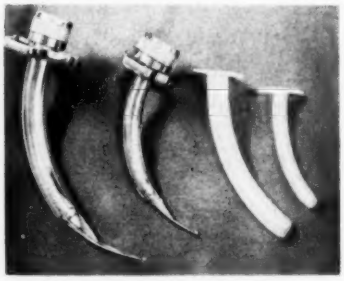
DESCRIPTION: Produced in sizes of 2, 5 and 10 cc., and with a choice of 17 different sizes of needles, each single-use syringe is automatically enclosed in a cellophane bag. The calibrated barrel and the plunger are molded of clear styrene, except for the molded rubber single-ring plunger tip. Absolute sterilization is achieved by a patented process. After use, the plastic syringe and the needle are discarded.
PRODUCER: Admiral Corporation, Chicago.

• SUPARA®

PURPOSE: Prenatal nutritional supplement.
COMPOSITION: Each tablet contains iron in the form of TOLFERATE® (ferrous fumarate), phosphorus-free calcium, and a balanced formula of essential vitamins. The daily dosage supplies 100 mg. elemental iron and 750 mg. calcium.
DOSAGE AND ADMINISTRATION: Three tablets daily. Because this form of iron causes no gastrointestinal irritation, the whole daily dosage may be taken at one time.
HOW SUPPLIED: Bottles of 100 and 1000.
PRODUCER: B. F. Ascher & Company, Inc., Kansas City, Mo.

• ALESTROL CAPSULES

PURPOSE: To reduce elevated blood cholesterol levels.
COMPOSITION: Each capsule contains 715 mg. of safflower oil (composed of approximately 530 mg. of linoleic acid, 125 mg. of oleic acid, and 0.02 to 0.03 per cent of mixed tocopherols) and 1.5 mg. of pyridoxine hydrochloride.
DOSAGE AND ADMINISTRATION: 2 to 4 capsules three times a day.
HOW SUPPLIED: Bottles of 100 and 1000.
PRODUCER: Testagar & Co., Inc., Detroit.



• SIERRA-SHELDEN TRACHEOTOME

DESCRIPTION: This size 4 tracheotome, for use in elective or emergency tracheotomy, consists of a slotted guide needle, a tracheotomy tube, a cutting trocar and a plastic inner cannula. The set is packed in a compartmented cloth bag and includes plastic sheaths for trocar and needle.
PRODUCER: R. A. Hawks Division, Sierra Engineering Company, Sierra Madre, Calif.
(Continued on page A-126)

in any case
it calls for

Sigmagen®

corticoid-salicylate compound

tablets

Composition

Meticorten® (prednisone)	0.75 mg.
Acetylsalicylic acid	325 mg.
Aluminum hydroxide	75 mg.
Ascorbic acid	20 mg.

Packaging: Sigmagen Tablets, bottles of 100 and 1000.

References: 1. Spies, T. D., et al.: J.A.M.A. 159:645, 1955. 2. Spies, T. D., et al.: Postgrad. Med. 17:1, 1955. 3. Gelli, G., and Della Santa, L.: Minerva Pediat. 7:1456, 1955. 4. Guerra, F.: Fed. Proc. 12:326, 1953. 5. Busse, E. A.: Clin. Med. 2:1105, 1955. 6. Sticker, R. B.: Panel Discussion, Ohio State M. J. 52:1037, 1956.

cute conditions: Two or three blets four times daily. After esired response is obtained, radually reduce daily dosage nd then discontinue.

ubacute or chronic conditions: nitially as above. When satisfactory ontrol is obtained, gradually reduce he daily dosage to minimum ffective maintenance level. For best esults administer after meals and t bedtime.

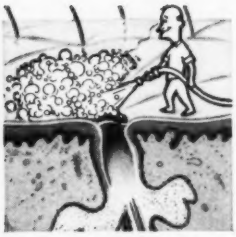
recautions: Because SIGMAGEN ontains prednisone, the ame precautions and ontraindications observed ith this steroid apply also o the use of SIGMAGEN.

SCHERING CORPORATION • BLOOMFIELD, N. J.

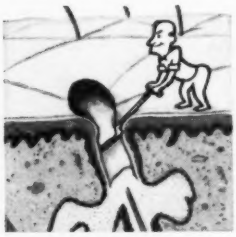
SG-J-648

Schering

IN ACNE **Fostex®** degreases the skin and helps remove blackheads



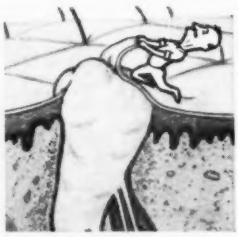
Fostex contains a combination of surface active agents (Sebulytic*) which: Completely emulsify excess oil so that it is quickly washed off the skin.



Penetrate and soften comedones, unblocking the pores and facilitating removal of sebum plugs.

Fostex dries and peels the skin

The Sebulytic base of Fostex dries and promotes peeling of the skin...actions enhanced by the keratolytic effects of micropulverized sulfur and salicylic acid.



*(Sodium lauryl sulfoacetate, sodium alkyl aryl polyether sulfonate, sodium dioctyl sulfosuccinate.)

Fostex is easy for your patients to use

Patients stop using soap on affected skin areas. Instead they use Fostex for therapeutic washing of the skin. The Fostex lather is massaged into the skin for 5 minutes—then rinse and dry.

FOSTEX CREAM for therapeutic washing of skin in the initial phase of acne treatment, when maximum degreasing and peeling are desired.

FOSTEX CAKE for maintenance therapy to keep skin dry and substantially free of comedones.

Write for Samples

WESTWOOD *Pharmaceuticals*
Division of Foster-Milburn Co. Buffalo 13, New York

New for Your Armamentarium

• TONGUE DEPRESSORS

DESCRIPTION: Available in either senior or junior size, these polished wooden tongue depressors are individually wrapped in white glassine paper which is airtight-sealed by crimp and adhesive.
PRODUCER: Forster Mfg. Co., Inc., Farmington, Maine.

• WYANOIDS® HC

PURPOSE: Treatment of inflammation in anorectal disorders.
COMPOSITION: Each suppository contains 10 mg. of hydrocortisone (as acetate), 0.5 per cent extract belladonna, 0.1 per cent ephedrine sulfate, zinc oxide, boric acid, bismuth oxyiodide, bismuth subcarbonate and balsam of Peru in an oily base.
INDICATIONS FOR USE: Radiation, medication and acute and chronic nonspecific proctitis; proctitis accompanying ulcerative colitis; acute internal hemorrhoids; cryptitis; postoperative scar tissue with inflammatory reaction, and internal anal pruritus.
DOSAGE AND ADMINISTRATION: 1 suppository twice daily for six days or as required.
HOW SUPPLIED: Boxes of 12.
PRODUCER: Wyeth Laboratories, Philadelphia 1.

• DILCORON

PURPOSE: To provide immediate relief from and prolonged prophylaxis against acute attacks of angina pectoris.
COMPOSITION: Each tablet contains an outer, sublingual layer of 0.4 mg. glyceryl trinitrate (nitroglycerin) and a core of 15 mg. pentaerythrityl tetranitrate.
DESCRIPTION: Separating the two vasodilators is a citrus-flavored lamina. When the tablet is administered, the full and immediate action of the nitroglycerin is obtained by holding it under the tongue until the citrus flavor is tasted. Once the flavor disappears, the remainder of the tablet is swallowed so the longer-acting pentaerythrityl tetranitrate can be absorbed slowly from the intestine.
PRODUCER: Winthrop Laboratories, New York.

(Continued on page A-128)

IN RESPIRATORY INFECTIONS

"...one does not wait..."

"...one does not wait for laboratory data but rather uses that combination most likely to be effective, based on experience and clinical judgment."

Welch, H.: AM&CT 3:375 (Nov.) 1956

- **Bactericidal**
- **Widest usefulness in the clinically important infections**
- **No cross resistance with other antibiotics reported**
- **No secondary overgrowth of yeasts or fungi reported**

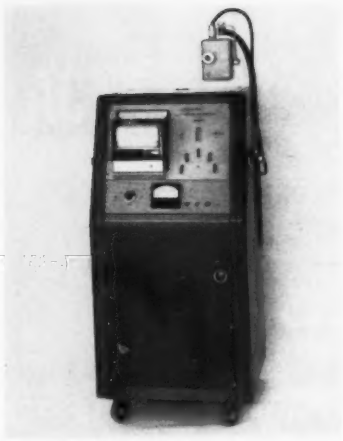
CATHOCILLIN® FORTE

(Sodium novobiocin with penicillin)

Capsules (green and white)
250 mg. novobiocin
150 mg. potassium penicillin G

ALSO AVAILABLE AS
CATHOCILLIN Capsules (blue and white)
125 mg. novobiocin
75 mg. potassium penicillin G

MERCK SHARP & DOHME Division of MERCK & CO., Inc., Philadelphia 1, Pa. MSD



• MEDICAL GAS MONITOR
(Model LB-2)

DESCRIPTION: Designed for monitoring patients under anesthesia and as an aid in diagnosing lung disorders, the system consists of a mobile console which houses a detector (pressurized for safety in an explosive atmosphere), amplifier, recorder, vacuum pump and other associated equipment. During anesthesia, the detector arm can be clamped directly to the operating table, with the console at a distance. In physiologic testing, the detector's adjustable height makes it possible to reach a patient in a standing, sitting or prone position. The monitor uses interchangeable detection cells which permit accurate measurement of carbon dioxide, nitrous oxide, cyclopropane, fluothane and other gases. For maximal flexibility, either a breathe-through sampling cell for monitoring the entire tidal volume or a microcatheter sampling cell for drawing off a fraction of the volume may be utilized.
PRODUCER: Spinco Division, Beckman Instruments, Inc., Palo Alto, Calif.

• BUTAZOLIDIN® ALKA

PURPOSE: To relieve pain, reduce fever and suppress inflammation.
COMPOSITION: Each capsule contains:

Butazolidin (phenylbutazone)	100 mg.
Aluminum hydroxide	100 mg.
Magnesium trisilicate	150 mg.
Homatropine methylbromide	1.25 mg.

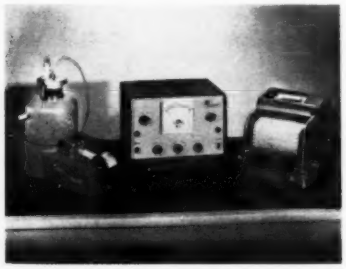
INDICATIONS FOR USE: Gout, rheumatoid and psoriatic arthritis, osteoarthritis, rheumatoid spondylitis, painful shoulder syndromes and acute superficial thrombophlebitis.
DOSAGE AND ADMINISTRATION: 1 to 4 capsules daily.
HOW SUPPLIED: Bottles of 100.
PRODUCER: Geigy Pharmaceuticals, Ardsley, N.Y.

• LENIC® VITAMIN MINERAL CAPSULES

PURPOSE: To provide vitamin supplement for adult and elderly patients, with added protection against high cholesterol levels.
COMPOSITION: Each capsule contains 10 vitamins, nine minerals, choline, inositol, methionine, and 370 mg. of linoleic, linolenic and the higher unsaturated acids.
DOSAGE AND ADMINISTRATION: 2 capsules daily.
HOW SUPPLIED: Bottles of 100.
PRODUCER: Crookes-Barnes Laboratories, Mountain View, N. J.

• LIQUAEMIN® SODIUM
(New Dosage Form)

PURPOSE: Anticoagulant therapy.
COMPOSITION: Each cartridge contains 20,000 U.S.P. units (200 mg.) of heparin sodium.
INDICATIONS FOR USE: Thrombo-embolic disorders.
HOW SUPPLIED: In 1 cc. disposable syringe form.
PRODUCER: Organon Inc., Orange, N. J.



• ACTIGRAPH II

DESCRIPTION: The unit scans, counts and records automatically the radioactivity distributed on strip radiochromatograms. The chart recording permits easy location and quantitative measurement of all radioactive zones on the strip. The unit includes the C100A strip feeder, a choice of window or windowless radiation detectors mounted in a lead shield for background reduction, a count rate meter, and a chart recorder. It is also equipped with a supply reel and a take-up reel accommodating up to 50 ft. of strip filter paper, 0.5 to 1.5 in. wide. When individual strips are spliced end to end, hours and even days of continuous scanning are possible with only the original speed, collimation and range set by the operator. An automatic shutoff switch turns off all units when the end of the strip chromatogram is reached. The rate of progress of the chart and the strip is synchronized at any of 10 different and constant speeds ranging from 0.75 in. per hour to 12 in. per minute.
PRODUCER: Nuclear-Chicago Corporation, Chicago.

(Continued on page A-130)

How Old is Too Old for Tranquilizers ?

The psychological needs of the elderly confront physicians with one of their most perplexing problems. Perhaps no other patient group suffers so much from emotional distress. Yet, precisely because of their age, geriatric patients often seem beyond the reach of tranquilizing treatment.

When tranquilization seems risky . . .

They are too much beset by complicating chronic ailments, too susceptible to serious side effects. Ataraxia is clearly indicated, yet the doctor cannot risk side reactions on liver, blood or nervous system.

Is there an answer to this dilemma?

We feel there is. In four recent papers investigators have reported good results with ATARAX in patients up to 90 years of age.* In one study, **improvement was "pronounced" in 76%, "good" in an additional 18.5%.*** ATARAX has been successfully used in such cases as senile anxiety, agitation, hyperemotivity and persecution complex.* On ATARAX, patients became ". . . quieter and more manageable. They slept better and demonstrated improved relations with other patients and hospital personnel. Even their personal hygiene improved, and they required less supervisory management."*

. . . ATARAX is safe

Yet even in the aged, ATARAX has given "no evidence of toxicity. . . . Complete liver function tests and blood studies were made on all patients after two months of therapy. . . . There were no significant abnormalities."* With still other elderly patients "tolerance to the drug was excellent, even in cases where the patients were given relatively high doses."* Similarly, no parkinsonian effects have been observed on ATARAX therapy.

Nor does ATARAX make your patients want to sleep all day. Instead, they can better take care of themselves, because ATARAX leaves them both calm and alert. In sum, ATARAX ". . . does not impair psychic function and has a minimum of side effects. . . . It appears that ATARAX is a safe drug. . . ."*

These, undoubtedly, are the results you want when emotional problems beset your geriatric patients. For the next four weeks, won't you prescribe tiny ATARAX tablets or pleasant-tasting ATARAX syrup – both so readily acceptable to the elderly.

*Documentation on request

ATARAX®
(BRAND OF HYDROXYZINE)

M. A. Seidel M.D.
Medical Director

ROERIG
New York 17, New York
Division, Chas. Pfizer & Co., Inc.

ATARAX
in any hyperemotive state

for childhood behavior disorders
10 mg. tablets—3-6 years, one tablet t.i.d.; over 6 years, two tablets t.i.d. Syrup—3-6 years, one tsp. t.i.d.; over 6 years, two tsp. t.i.d.

for adult tension and anxiety
25 mg. tablets—one tablet q.i.d. Syrup—one tbsp. q.i.d.

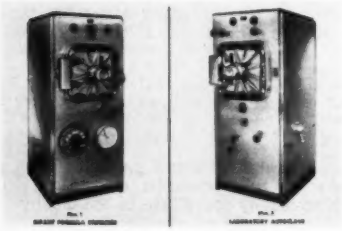
for severe emotional disturbances
100 mg. tablets—one tablet t.i.d.

for adult psychiatric and emotional emergencies
Parenteral Solution—25-50 mg. (1-2 cc.) intramuscularly, 3-4 times daily, at 4-hour intervals. Dosage for children under 12 not established.

Supplied: Tablets, bottles of 100. Syrup, pint bottles. Parenteral Solution, 10 cc. multiple-dose vials.

• FRENCH PRESSURE CELL

DESCRIPTION: This instrument explodes biologic cell walls without disturbing the nucleus, making possible closer study of the cell center. Blood cells, unicellular organisms or the cellular structures of living tissues or serums are placed in the cylinder and the air is removed. The unit is then positioned under a hydraulic press and pressures up to 20,000 lb. per square inch are applied and suddenly released, resulting in the explosion of cellular walls. The instrument can also be used for extraction of virus and virus-related materials. The sample is obtained through a pressure-release valve with constant pressure being maintained on the equipment. The unit is constructed of stainless steel and has a 6 by 3 in. body; the 1 in. diameter hole drilled in the center is fitted with a piston.
PRODUCER: American Instrument Company, Silver Spring, Md.



• STRAIGHT-LINE STEAM STERILIZERS

DESCRIPTION: Developed in an attempt to furnish maximum chamber capacity per unit cost, the square shape of the chamber is adapted particularly well to the rectangular shape of most hospital packs, prepacked boxes of instruments, and glass containers. This series incorporates all standard features of the Castle cylindrical models, including full-steam jacket and dual-lock door. The new design is available in the Castle dressing sterilizer, infant formula sterilizer (left), high-speed instrument sterilizer and laboratory autoclave (right). Units are available with steam or electric heating and in recessed or cabinet models.
PRODUCER: Wilmot Castle Co., Rochester, N.Y.

• ADAPTIC NONADHERING PACKING STRIPS

DESCRIPTION: Drainage passes through the mesh of the nonabsorbent coated fibers and does not coagulate, thus allowing the packing strips to be removed without pain or tissue damage. Because the strips conform to body contours, they give uniform packing pressure.
HOW SUPPLIED: 4 yd. strips available in ½ in., 1 in. and 2 in. widths.
PRODUCER: Hospital Division, Johnson & Johnson, New Brunswick, N. J.

• BENNETT ASSISTER

DESCRIPTION: Utilizing the flow-sensitive Bennett valve, this unit offers fully controlled, assisted, partially assisted, patient-controlled or manually controlled respiration options to the anesthetist. Powered by oxygen or compressed air from a cylinder or wall outlet, the assister is pneumatically operated to eliminate electric hazard. Tidal volume is positively indicated. Adjustable negative pressure, rate and pressure controls are features of the unit.
PRODUCER: Bennett Respiration Products, Inc., Los Angeles.

• SIGNEMYCIN®
(New Dosage Form)

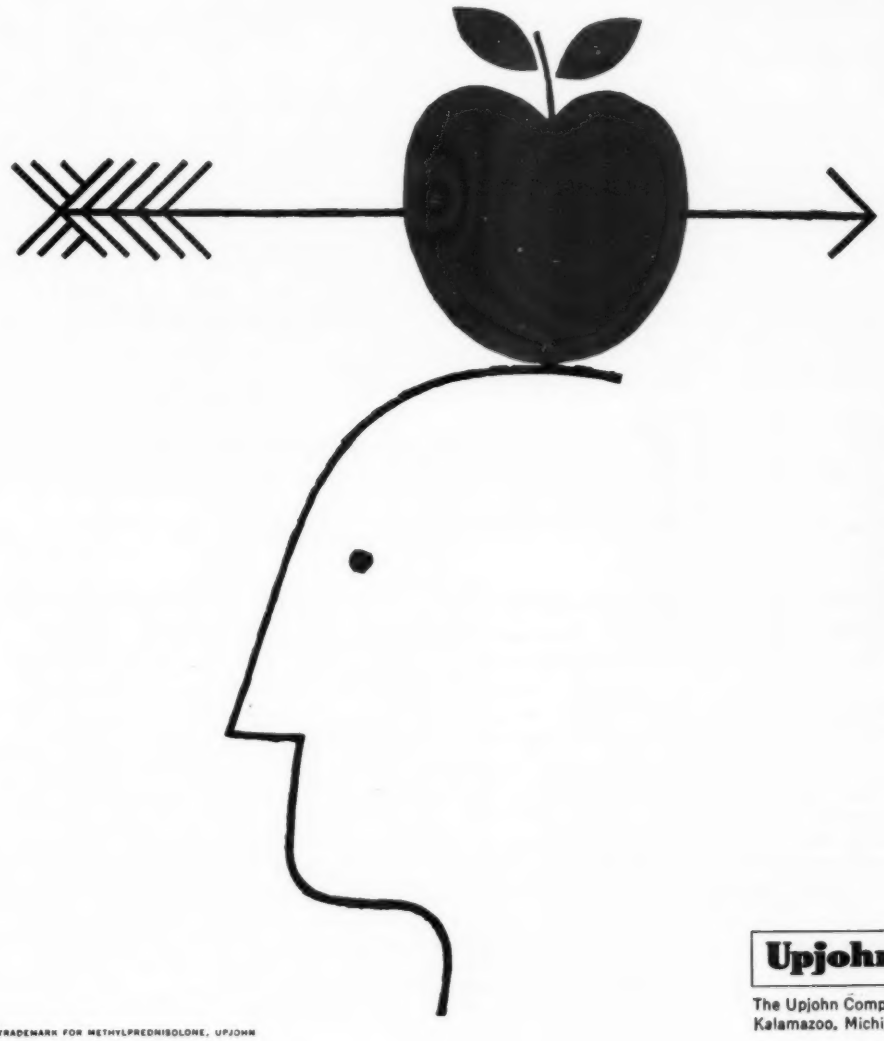
PURPOSE: Treatment of microbial infections in pediatric patients and those unable to take solid medicaments.
COMPOSITION: Each teaspoonful (5 cc.) of the raspberry-flavored syrup contains 42 mg. oleandomycin as triacetyloleandomycin, and tetracycline equivalent to 83 mg. tetracycline hydrochloride.
HOW SUPPLIED: 2 oz. and 1 pt. bottles.
PRODUCER: Pfizer Laboratories Division, Chas. Pfizer & Co., Inc., Brooklyn.

(Continued on page A-132)

Medrol*

the corticosteroid that hits the disease

but spares the patient



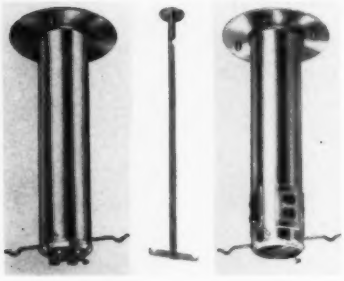
*TRADEMARK FOR METHYLPREDNISOLONE, UPJOHN

Upjohn

The Upjohn Company
Kalamazoo, Michigan

• SANI-JET BEDPAN WASHER

DESCRIPTION: Fully automatic, the washer empties, jet washes and steam flushes soiled bedpans in 60 seconds. The unit is available in combinations of cold water and steam, cold and hot water, and cold water only. It features an access door that opens at a touch of the foot pedal, adjustable jet nozzles, an automatically timed washing cycle and an emergency control handle to cycle the run manually. The washer is available in floor pedestal (shown above), recessed and wall-hung models.
PRODUCER: Wilmot Castle Co., Rochester, N.Y.

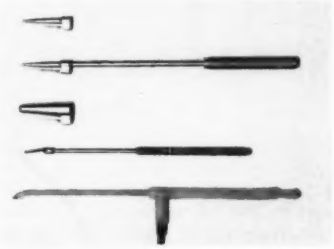


• OVERHEAD GASES, VACUUM, INTRAVENOUS AND ELECTRIC SERVICES

DESCRIPTION: Facilitating safety and free movement of traffic, these overhead services make floor space in surgical and recovery rooms available for more efficient use. The equipment includes a Surgical Gases Dispenser Unit (left), with any standard coupler required for gases, surgical air and vacuum; Quick-attachable Intravenous Hook and Hanger (center), and an Electric Unit with intravenous hooks (right). The products are of triple chrome-plated brass.
PRODUCER: The Logan Hospital Equipment Company, Glendale, Calif.

• PROJECTOR-VIEWER

DESCRIPTION: Clear diagnostic detail of medical specimens and x-rays is shown by this 35 mm., 500 W projector. Roll film, strips or 2 by 2 in. slides can be used interchangeably. A unique cooling system permits even a cardboard-mounted slide to be projected for hours without buckling.
PRODUCER: Micro X-Ray Recorder, Chicago.



• CERVITOME AND COAGSUC

DESCRIPTION: This set of two instruments for cervical conization and simultaneous coagulation and suction consists of three sizes of straight blade holders with a universal handle, an angled blade holder and a suction tube (shown at bottom) to stop bleeding after conization. To obtain the whole endocervix as a cone, a blade holder of the proper size is inserted into the external os, and tissue lateral to the external os is pierced with the point of a No. 11 blade which is forced deeper into the canal until the blade's cutting edge is fully utilized. By circumscribing the cervical os, a cone of undistorted tissue is obtained. The Coagsuc, or suction tube with a coagulating point, may be used to save time and sponges. Visibility is greatly improved as the smoke and blood are sucked away, making the coagulation faster and more accurate in the visible and comparatively dry field.
PRODUCER: Milex Products, Chicago.
(Continued on page A-134)

HYPERTENSIVE...yet controlled
with safer combination therapy

"objective relief...gratifying"

Rauvera—the combination of alseroxylon and alkavervir—is much more effective than either drug alone. This combination produces "no postural hypotension, no organ toxicity, and no sensitization reactions. Tolerance does not develop on prolonged administration...hypotensive action is steady and prolonged and persists over the entire twenty-four hours."[1] Rauvera therapy can be continued over long periods of time.

"subjective relief...even more so"[1]

Alseroxylon and alkavervir "when combined produce mutual reinforcement so that...more severe cases respond," yet "side effects are minimal."[2] Most patients feel better, are less tired and are free from headaches.[3] Anxiety and tension are relieved...pulse rate slowed...such symptoms as "heart consciousness," tinnitus, vertigo, giddiness and insomnia disappear rapidly —leaving a calm and relaxed patient.

RAUVERA®

1 mg. alseroxylon—3 mg. alkavervir in each scored tablet.

1. Bendig, A.: New York State J. M. 66:2523, 1956. 2. La Barbera, J. F.: Med. Rec. and Ann. 50:242, 1956. 3. Gilchrist, A. R.: Brit. M. J. No. II:1011, 1956.

SMITH-DORSEY • a division of The Wander Company • Lincoln, Nebraska

• DEEPFREEZE® FOR BLOOD VESSELS

DESCRIPTION: Designed for cold preservation of human parts, these units, which are no larger than an average desk, require only installation of water supply and discharge facilities and placing of a plug into a 110 V line. The units keep constant temperatures of –40°, –100° or –125° F., and feature a recording device which registers the temperature 24 hours a day. Arterial segments, bone, skin or eyes for grafting purposes may be stored in the units which can be kept on the same floor as the operating rooms for maximal availability.
PRODUCER: Tenney Engineering, Inc., Union, N. J.

• CARDILATE

PURPOSE: To provide prolonged prophylaxis of angina pectoris attacks.
COMPOSITION: Each tablet contains .15 mg. of erythrityl tetranitrate.
CAUTION: A temporary headache is apt to occur with doses larger than 2 tablets three times a day.
DOSAGE AND ADMINISTRATION: 1 tablet dissolved sublingually or in the buccal pouch three times daily after meals; for patients who have nocturnal angina, an additional tablet about one hour before bedtime.
HOW SUPPLIED: Bottles of 100.
PRODUCER: Burroughs Wellcome & Co. (U.S.A.) Inc., Tuckahoe, N.Y.

• SPENSIN

PURPOSE: To provide symptomatic relief from diarrhea.
COMPOSITION: Each fluid ounce contains 3 gm. activated attapulgite and 270 mg. pectin in alumina gel, in suspension form.
DOSAGE AND ADMINISTRATION: For adults, 2 tablespoonfuls, followed by 1 tablespoonful after each bowel movement until diarrhea is controlled; for children, 1 or more teaspoonfuls, according to age. May be taken with or without water.
HOW SUPPLIED: In 6 fl. oz. bottles.
PRODUCER: Ives-Cameron Company, Philadelphia.

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PURPOSE: Prophylaxis and treatment of thrombosis and embolism by oral administration.
COMPOSITION: Each tablet contains 3 mg. of 3-(1′-phenylpropyl)-4-hydroxycoumarin.
INDICATIONS FOR USE: Thrombophlebitis, phlebothrombosis, coronary thrombosis, coronary occlusion with myocardial infarction, pulmonary embolism and other arterial thromboses.
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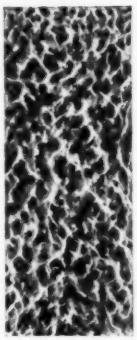
PRODUCER: Becton, Dickinson and Company, Rutherford, N. J.



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► CURRENT SURGICAL MANAGEMENT
A Book of Alternative Viewpoints on Controversial Surgical Problems

Edited by John H. Mulholland, M.D., George David Stewart Professor of Surgery, New York University College of Medicine, New York, Edwin H. Ellison, M.D., Associate Professor of Surgery, Ohio State University College of Medicine, Columbus, and Stanley R. Friesen, M.D., Associate Professor of Surgery, Pathology and Oncology, University of Kansas School of Medicine, Kansas City, with 76 contributors. 494 pages, illustrated. 1957, W. B. Saunders Company, Philadelphia and London. $10.00.

Since varying viewpoints are common to any inexact science, controversy in surgical thought is expected and accepted. It is true, however, that misunderstanding and confusion are present where differences of opinion exist. This is particularly unfortunate in surgery, since often one must look to authoritative opinion rather than to fact in solving practical problems of management. Certainly, so-called enlightened opinions seldom are accepted blindly, but, on the other hand, impartial critical analysis of the conclusions of others often is difficult.

The surgical literature which deals predominantly with controversial subjects is helpful in resolving some of this confusion. However, alternative viewpoints seldom are emphasized and biased presentations are not always avoided. Moreover, the controversial aspects of surgery seldom are presented in textbooks of surgery. These tendencies are surprising, since the educational value of debate is so well recognized.

Impressed by this situation and stimulated by the success of panel discussions, Drs. Mulholland, Ellison and Friesen have contributed to and edited a collection of interesting, informative and stimulating papers on the controversial aspects of surgical management. Divergent viewpoints are recorded side by side, so that the reader may compare the backgrounds for the varying conclusions reached by individual authors. The contributors are recognized leaders in surgical thought and practice, and their discussions are presented in a factual and practical manner. Although the book does not have the scope of the usual textbook of surgery, the problems discussed are those most commonly encountered by the general surgeon.

This book should be most useful to the practicing surgeon who is confronted daily by problems of management. It will enable him to reevaluate his own practices and to gain insight into the opinions of others. It also will provide excellent orientation for the student of surgery who is understandably quite confused by the varying opinions that are found in the current surgical literature.

M. A. A.

(Continued on page A-149)

► URINE AND THE URINARY SEDIMENT A Practical Manual and Atlas

By Richard W. Lippman, M.D., Fellow of the John Simon Guggenheim Memorial Foundation. New York. Ed. 2. 140 pages with 92 color photographs. 1957, Charles C Thomas, Springfield, Illinois. $8.50.

Printed on good paper, this small book concerning everyday clinical laboratory procedures is a joy to read. Chapter 1 is on proteinuria and elements of the urinary sediment, with many color illustrations. The second chapter, consisting of observations on the urine in disease, is well illustrated. The third, and last, chapter is on general considerations and technic, followed by an extensive list of references. Medical technologists and clinical pathologists will find this manual very helpful.

A. H. S.

► THE YEAR BOOK OF GENERAL SURGERY 1957-1958 Year Book Series

Edited by Michael E. DeBakey, M.D., Professor of Surgery and Chairman, Cora and Webb Mading Department of Surgery, Baylor University College of Medicine, Houston. 560 pages, illustrated. 1957, The Year Book Publishers, Inc., Chicago. $7.50.

Selective reviews of the current surgical literature reflect admirably the great progress that has been made. The abstracts are from papers published between May 1956 and May 1957.

The first portion is devoted to some general considerations such as tracheostomy, the artificial kidney, homograft rejection and fat embolism. This is followed by a fairly complete coverage of shock, fluid, electrolyte balance, wound healing, neoplasm and the thyroid and parathyroid glands. The remaining portion covers general surgery involving the different organ systems.

The section on heart, aorta and peripheral arteries is larger than in previous years, and is well illustrated. The editor has made numerous constructive comments on these abstracts.

The section on stomach and duodenum has always been a long one. Much of the material covers basic studies on the function of the stomach and duodenum. On the clinical side, studies such as comparison of Billroth I and II operations, and long-term follow-up after various gastric operations are included.

Among the reviews in the section on the colon and rectum are reports on the encouraging results of follow-up after ileoproctostomy. Other articles, however, caution against ileoproctostomy because of the high incidence of recurrence of ulceration in the rectal stump. Colectomy with simultaneous ileostomy is described and illustrated in detail.

From the material given, it is apparent that much investigative work is being done on the problem of ventilation and circulatory dynamics. The discovery of new drugs in the tranquilizer field and of muscle relaxants has also brought about new investigative evaluations.

Y. S.

► SYNOPSIS OF GASTROENTEROLOGY

By Rudolf Schindler, M.D., Clinical Professor of Medicine, Department of Gastroenterology, College of Medical Evangelists, Los Angeles. 395 pages. 1957, Grune & Stratton, Inc., New York and London. $7.75.

In dealing with the wide variety of conditions now encompassed in the specialty of gastroenterology, the author has included comments about almost everything. However, the brevity and superficiality of his remarks on many of the topics tend to reduce the value of the book to the general practitioner and the internist for whom it is primarily intended.

The introductory chapters on etiology, symptomatology, examination in gastrointestinal disorders, and, particularly, the probable significance of specific digestive complaints provide considerable useful information. Of interest, too, is the discussion concerning the gastrointestinal manifestations of primary disease in other organ systems.

The remaining chapters are divided according to specific organs and include didactic discussions of varying completeness on many disease entities. The author's own predilection for certain conditions, such as gastritis, is evident in the discussions. For a reader interested in a little information about a lot of subjects, this synopsis should be quite adequate.

J. A. H.

(Continued on page A-150)

► ANESTHESIA AND OTOLARYNGOLOGY

By Donald F. Proctor, M.D., Assistant Professor of Laryngology and Otology, The Johns Hopkins University School of Medicine, Baltimore. 267 pages, illustrated. 1957, The Williams & Wilkins Company, Baltimore. $7.00.

Although the author says he felt compelled to write this book, it is difficult to be impressed with the data he has collected concerning mortality and morbidity rates associated with otolaryngologic surgical procedures. At least one of the sources which he cites is said to be an illustrious example of the misuse of statistical material.

So far as the views of many other surgeons are concerned, his treatment of conditions of the ears, nose and throat is controversial. The volume covers preoperative preparation of the patient, preanesthetic medication and the ancillary use of drugs, pulmonary ventilation, postanesthetic care and medicolegal considerations. The book is indexed and a list of references is given at the end of each chapter.

J. S. L.

► THE HANDICAPPED AND THEIR REHABILITATION

Edited by the late Harry A. Pattison, M.D., former Director of The Potts Memorial Institute, Inc., Hudson, New York. 944 pages. 1957. Charles C Thomas, Springfield, Illinois. $14.75.

Forty-four well-known authors, each highly trained in his respective field, have contributed to this excellent volume. The opening chapter on the philosophy, operation and effectiveness of physical medicine and rehabilitation explains some of the problems and many of the challenges present in this field. In the following chapter, Dr. Pattison reviews genotypic and environmental factors that modify the human constitution.

Subsequent chapters include discussions on: rehabilitation of the injured worker; nontraumatic disabilities; plastic and reconstructive surgery; special problems of the handicapped child; patients with heart disease, tuberculosis or cancer; problems of the aged; blindness, and epilepsy and rehabilitation. A long discussion on the principles of psychiatry and psychotherapy by Dr. Edward A. Strecker is included and is well worth the purchase of this volume. In addition, the roles played by the psychologist and other members of the rehabilitation team, the medical rehabilitation coordinator, medical social worker and professional nurse are considered.

At the end of each chapter are references, a bibliography, suggested collateral reading, and, in some instances, available films.

I. P. F.

► INTRODUCTION TO ANESTHESIA The Principles of Safe Practice

By Robert D. Dripps, M.D., Professor and Chairman, Department of Anesthesiology, James E. Eckenhoff, M.D., Professor of Anesthesiology, University of Pennsylvania, Philadelphia, and LeRoy D. Vandam, M.D., Clinical Professor of Anesthesia, Harvard Medical School, Boston. 266 pages. 1957, W. B. Saunders Company, Philadelphia and London. $4.75.

The prime virtue of works which emanate from large medical institutions is the vast experience which such volumes reflect, or should reflect. The University of Pennsylvania Medical School and the Harvard Medical School are two such institutions.

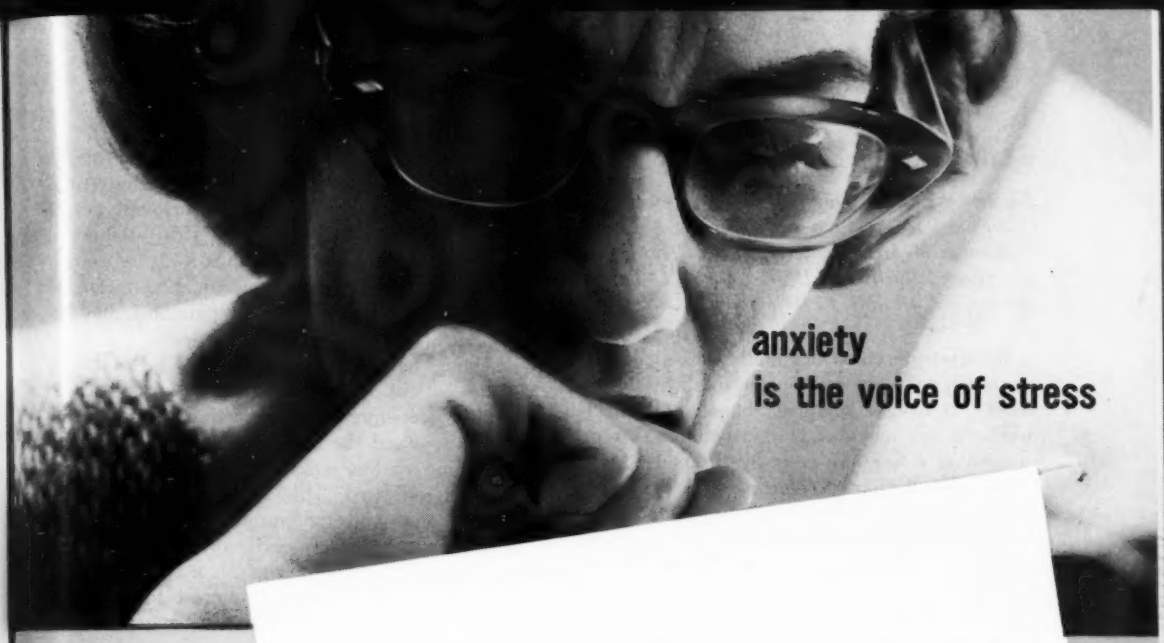
The authors, who are from these universities, are practitioners of impressive experience, and it is this experience which is of most benefit to the reader. They have dealt extensively with the field of anesthesia, even including practical information on managing narcotic poisoning.

This volume has four main divisions. The first, logically, is devoted to the preanesthetic period: the second proceeds to the day of anesthesia; the third deals with events during the operation, and the fourth considers the postoperative period. A fifth section, subsidiary to these four, sets forth a number of useful measures, such as cardiac resuscitation, pediatric anesthesia, anesthesia for ambulatory patients, obstetric anesthesia, etc.

This volume evolved from a small, privately printed work issued in 1949 for use in the University of Pennsylvania Hospital, called "Organization and Procedures" (in anesthesia). A second and larger edition was issued in 1953, but was still restricted to private circulation. Workers in anesthesia have just cause for gratitude to the authors for their action in making the third edition, the present volume, available to them.

J. S. L.

(Continued on page A-152)



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► DIGITALIS

Edited by E. Grey Dimond, M.D., Professor and Chairman, Department of Medicine, University of Kansas Medical Center, Kansas City, Kansas. 255 pages, illustrated. 1957, Charles C Thomas, Springfield, Illinois. $7.00.

Material presented originally at a symposium on the digitalis glycosides, sponsored by the University of Kansas Medical School, and selected additions are included in this volume. A reproduction of a fine old essay by Ralph H. Major, concerning William Withering and the origins of digitalis, opens the book. This is followed by a review of the pharmacologic basis for digitalis therapy, its physiologic actions and its fate and deposition in animal and man. At the scientific level, the chapter of greatest interest is that by Okita, which summarizes the metabolic fate of radioactive digitoxin in man. At the clinical level, the sections by Lown on potassium, digitalis and auricular arrhythmia due to digitalis are of special interest.

There is much about this volume to recommend it, particularly those sections which present as a unit material previously scattered widely in technical and clinical literature. However, much of the material appears to have been recorded and transcribed from the original informal presentations. Thus, these sections contrast sharply with the better organized, more readable products of the pen.

J. C. B.

► GASTRO-INTESTINAL OBSTRUCTION

By Meyer O. Cantor, M.D., Associate Attending Surgeon, and Roland P. Reynolds, M.D., Chief of Surgery, Grace Hospital, Detroit. 565 pages with 415 illustrations. 1957, The Williams & Wilkins Company, Baltimore. $18.00.

Obstruction of the intestinal tract continues to be a major problem in general surgery. This work is one of the most complete and up-to-date textbooks available on the subject. Both authors have had extensive experience in the clinical management of this problem and, in addition, have reviewed nearly 18,000 published articles. The result is a book encyclopedic in its coverage and presentation.

Considering first the historical aspects of gastrointestinal obstruction and the embryology, anatomy and physiology of the gastrointestinal tract, the discussion proceeds to various types of obstruction and their etiology; x-ray diagnosis, covered in detail with numerous x-ray reproductions; distention; disorders simulating intestinal obstruction; nursing care of patients; and intestinal obstruction resulting in death.

Almost half the book is devoted to treatment of the patient. Particular attention is paid to intestinal decompression, correction of electrolyte imbalance, and the evaluation of the patient to determine whether surgery or nonoperative treatment is indicated. This latter aspect is highly controversial and the authors appear to have covered every phase clearly and with adequate explanation of the decisions made.

A chapter of particular interest to surgeons considers intestinal obstruction after gastric and colonic surgery. Numerous x-ray reproductions and line drawings illustrate this very well.

Y. S.

► HYPOPHYSECTOMY

Edited by O. H. Pearson, M.D., Associate Professor of Medicine, Cornell University Medical College, New York, with 24 participants. American Lecture Series. 154 pages, illustrated. 1957, Charles C Thomas, Springfield, Illinois. $5.00.

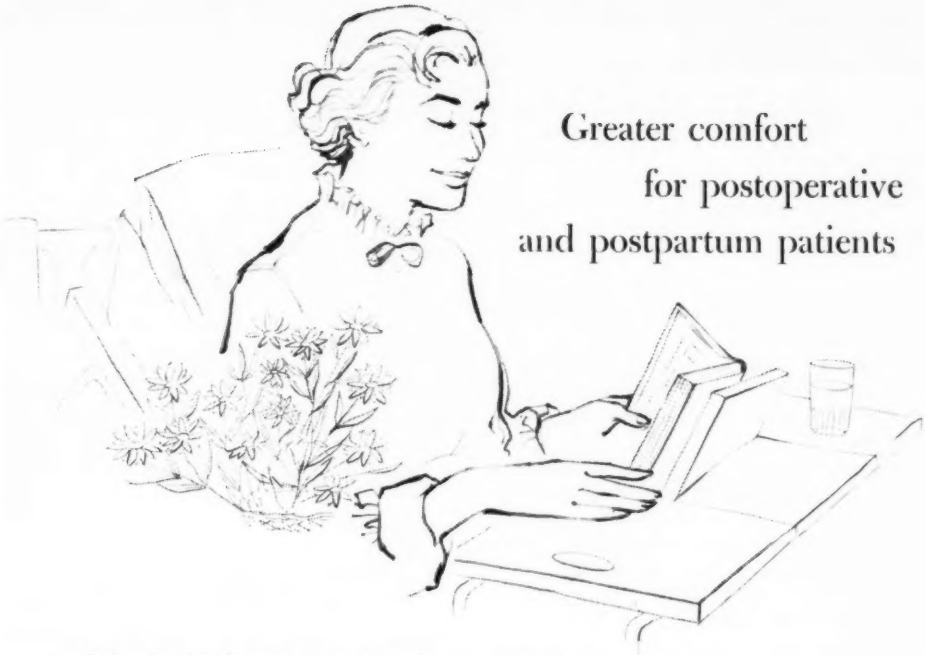
The clinical application of hypophysectomy in cancer is quite new and is still in the investigative phase. The indications for this procedure, the technics involved, and the complications and results are presented in this monograph. Especially interesting is the section on the physiologic effects of hypophysectomy, including glandular functions, alterations, symptoms and treatment.

Although surgical hypophysectomy is the procedure mentioned in most of the reported series, it is discussed only briefly, while radiation hypophysectomy is presented in considerable detail. Both radon implantation technic and external beam irradiation are discussed.

The morbidity and mortality rates are higher in hypophysectomy than in most operative procedures, and, since most of the individual series presented in this book are rather small, the investigators do not offer any definite conclusions in regard to this problem.

Y. S.

(Continued on page A-154)



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► THE YEAR BOOK OF PEDIATRICS 1957-1958 Year Book Series

Edited by Sydney S. Gellis, M.D., Professor of Pediatrics and Chairman of the Department of Pediatrics, Boston University School of Medicine, Boston. 469 pages with 153 illustrations. 1957, The Year Book Publishers, Inc., Chicago. $7.50.

The annual appearance of this small volume is eagerly awaited by those interested in the pediatric field, especially the busy practitioner who could not possibly find time to read the mass of literature abstracted here. The material presented covers the world pediatric literature from May 1956 to May 1957.

As usual, information is arranged according to organ systems or special fields. Comments by the editor make some of the most interesting reading in the book. There are numerous illustrations, figures and tables, all clearly reproduced. The type is easily read and the reviews are short so that the book may be read for brief periods without loss of continuity. An interesting feature is the inclusion of a Year Book quiz which the reader may find challenging.

S. D. M.

► MECHANISMS OF HYPERTENSION With a Consideration of Atherosclerosis

By Henry Alfred Schroeder, M.D., Associate Professor of Medicine, Washington University School of Medicine, St. Louis. American Lecture Series. 379 pages, illustrated. 1957, Charles C Thomas, Springfield, Illinois. $9.00.

Having written extensively on the subject of hypertension, the author's familiarity with the subject is obvious in this monograph in which the known and suspected mechanisms of hypertension are considered in detail. There are 448 references, and a very comprehensive index, including a section for authors. Experimental data are extensively quoted and illustrated in support of arguments.

The causes of hypertension are very adequately discussed in closely coordinated chapters dealing with basic (or constitutional) factors, neurogenic effector mechanisms, nephrogenic effector mechanisms and factors influencing the conversion of neurogenic to nephrogenic hypertension. Endocrine factors in the production of hypertension also are considered in detail.

Extensive discussion is given to the effect of trace metals, including the metals concerned in metallo-enzymes, in cardiovascular disease, and to the action of drugs as chelating agents. There is interesting speculation regarding the possibility that abnormal trace metals may act upon enzymatic mechanisms to produce hypertension, and that chelating agents, by the removal of trace metals, may act as antihypertensive drugs. The possible role of hydralazine in this regard is emphasized. Although much of this chapter is of a speculative nature, it is reasonably presented.

A chapter on the therapy of hypertension considers all the commonly used drugs which were available at the time of writing. Again there is a marked emphasis on the pharmacologic and therapeutic properties of hydralazine.

D. C. C.

► CARDIOVASCULAR REHABILITATION

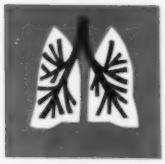
Edited by Paul Dudley White, M.D., Massachusetts General Hospital, Boston; Howard A. Rusk, M.D., Director, Institute of Physical Medicine and Rehabilitation, New York University-Bellevue Medical Center, New York; Bryan Williams, M.D., Clinical Instructor in Medicine, Southwestern Medical School, University of Texas, Dallas, and Philip R. Lee, M.D., Department of Internal Medicine, Palo Alto Clinic, Palo Alto, California. 155 pages. 1957, The Blakiston Division, McGraw-Hill Book Company, Inc., New York, Toronto and London. $6.50.

This well-edited volume is comprised of material presented at a recent conference held at the New York University-Bellevue Medical Center and sponsored by the Institute of Physical Medicine and Rehabilitation. The contributors are widely known and their views will be of interest and help to all practicing physicians.

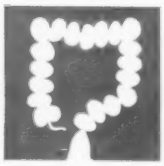
The problems confronting the person with cardiovascular disease, including the effect on his emotions and his work, are well presented. The discussions on the teaching and practice of cardiovascular rehabilitation and on research in this field will give most readers a greater interest in and understanding of the problems of both physician and patient.

I. P. F.

(Continued on page A-158)



espiratory infections

nfections 

miscellaneous

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Books received are acknowledged in this department. As space permits, books of principal interest to our readers are reviewed more extensively.

Digestive System; Liver, Biliary Tract and Pancreas. The Ciba Collection of Medical Illustrations. Prepared by Frank H. Netter, M.D. Edited by Ernst Oppenheimer, M.D., with five contributors. Vol. 3, Pt. III. 165 pages with 133 full-color plates. 1957, Ciba Pharmaceutical Products Inc., Summit, New Jersey. $10.50.

The Postoperative Chest; Radiographic Considerations After Thoracic Surgery. The John Alexander Monograph Series. By Hiram T. Langston, M.D., Chief of Surgery, Anton M. Pantone, M.D., Radiologist, and Myron Melamed, M.D., Associate Radiologist, State Tuberculosis Sanitarium, Chicago. 228 pages with 80 illustrations. 1957, Charles C Thomas, Springfield, Illinois. $8.00.

Gynecologic and Obstetric Pathology; With Clinical and Endocrine Relations. By Emil Novak, M.D., late Assistant Professor Emeritus of Gynecology, and Edmund R. Novak, M.D., Assistant Professor of Gynecology, The Johns Hopkins Medical School, Baltimore. Ed. 4. 650 pages with 683 illustrations, 25 in color. 1958, W. B. Saunders Company, Philadelphia and London. $14.00.

The Planning of International Meetings. A handbook issued by the Council for International Organizations of Medical Sciences established under the joint auspices of UNESCO and WHO. 113 pages. 1958, Charles C Thomas, Springfield, Illinois. $2.50.

A Textbook of Clinical Neurology; With an Introduction to the History of Neurology. By Israel S. Wechsler, M.D., Consulting Neurologist, The Mount Sinai Hospital, New York. Ed. 8. 782 pages with 179 illustrations. 1958, W. B. Saunders Company, Philadelphia and London. $11.00.

Abnormal Labor. American Lecture Series. By L. A. Calkins, M.D., Department of Gynecology and Obstetrics, University of Kansas Medical Center, Kansas City. 70 pages. 1957, Charles C Thomas, Springfield, Illinois. $2.75.

Office Gastroenterology. By Albert F. R. Andresen, M.D., Clinical Professor Emeritus of Medicine, State University of New York College of Medicine, Syracuse. 707 pages with 110 illustrations. 1958, W. B. Saunders Company, Philadelphia and London. $14.00.

An Introduction to Functional Anatomy. By David Sinclair, M.D., Professor of Anatomy, University of Western Australia, Nedlands, Australia. 426 pages with 166 illustrations. 1957, Charles C Thomas, Springfield, Illinois. $8.50.

Drugs; Their Nature, Action and Use. By Harry Beckman, M.D., Director, Department of Pharmacology, Marquette University Schools of Medicine and Dentistry, Milwaukee. 728 pages with 126 illustrations. 1958, W. B. Saunders Company, Philadelphia and London. $15.00.

Expectant Motherhood. By Nicholson J. Eastman, M.D., Professor of Obstetrics, The Johns Hopkins University School of Medicine, Baltimore. Ed. 3. 194 pages, illustrated. 1957, Little, Brown & Company, Boston. $1.75.

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DR. Pepys' Pages

Personal Diary
and Observations on
Medical Life
by MORRIS FISHBEIN, M.D.

Jan. 1—All morning getting ready for the New Year's reception which Mistress Pepys arranges. The punch—6 qt. champagne, 1 qt. lemon ice and 1 jigger brandy—delighted in particular Van Dellen and Art Snider. First to come were Harold Aronson and his lady, then Sam Rosenthal to admire the orchid tree and pledge friendship, then the faculty from the University of Chicago, the leaders from Hektoen Institute, and the devoted people from La Rabida. Came also many, many more—Alvarez and his warm-hearted spouse; Maurice Goldblatt, great philanthropist; Fabricant and Johnston Hammond and Howard Willett, who delights in blini with caviar and brandy. Karl Meyer, Louis Mann, Sam Hoffman and old Pepys discussed the motivation that arises from desperation, and the afternoon was sweetened by Antoinette Pope, who came bearing a great box of such candies as only she can prepare.

Jan. 2—Much writing and in the evening to hear the great Stokowski conduct Brahms, Bach, Wagner and a hardly understandable toccata, by a Polish composer. From his tapering fluorescentlike fingers the conductor conjures great flowing, swelling tones such as no other conductor seems to develop.

Jan. 3—The winter cold is on us so spent all the day at the desk; in between, read "Russia Revisited," by Louis Fischer, whose record of diagnostic signs of revolt in Russia's satellites indicates the presence of internal ulcers in the communist empire.

Jan. 4—For a long walk on various errands and in the afternoon, while reading a mystery by Holly Roth and rereading Suetonius' "The Twelve Caesars," watched two good basketball games on television. In the meantime engaged with our visiting teen-agers—Morris and Merriel Friedell—in trying to realize the changes in social attitudes regarding adolescence. In this, greatly aided by George Mohr's chapter on the subject in the new encyclopedia being prepared for Doubleday.

Jan. 5—In the afternoon with Charles Lawrence and Charles Huggins to visit Sidney Farber, here to lecture on the cancers of the child for the University of Chicago, and found him stricken with an enterocolitis like that which felled old Pepys a few weeks previously. In the evening with Maurice Goldblatt and his lady to the Standard Club for a dinner to which came Walter Kraft, Dwight Clark, Ricketts, Hatcher, Hodges, Jacobson, Carpenter, Rothman and all the ladies, and discussed a new educational project.

Jan. 6—To the Chicago Heart Association, discussing with Katz, DeBoer and Abrams the development of a home service for the Cook County Hospital. Next to the Billings Hospital where a multitude assembled to hear Sidney Farber's lecture, and though just up from his illness he spoke beautifully, telling of progress against cancer, leukemia, sarcoma and such terrible illnesses in childhood. The progress has been significant with chemotherapy, radiation, surgery, actinomycin D and other technics. Thereafter to see the opening of "Long Day's Journey Into Night," which was done superbly by a cast in which Fay Bainter shone brilliantly. This play, based on the life of Eugene O'Neill, was full of the pathology of mental disturbance—narcotic addiction, alcoholism, Oedipus complex—and yet full of the drama of life.

Jan. 7—At noon to luncheon with Max Thorek, and consolidated plans for meetings in Los Angeles and Brussels. Found him immersed in his great collection of autographs of famous personalities, and stood in awe before those of William Harvey, Edward Jenner and Augustus Washington, father of George. In the evening came the Friedells, newly returned from Palm Springs, so played gin with Friedell and my brother Albert, and Friedell, as usual, collected.

Jan. 8—In the morning to La Rabida for photographs with Mesdames Wolfson and Brown, who presented a check for $15,000. In the evening to the Empire Room at the Palmer House, dining with the Lewins, Zeitlins, Griff Williams and Lipseys, and listening to Jaye P. Morgan and her brothers, with great pleasure in the sound and in the viewing. Also were two Hungarian refugees who danced beautiful ballet and adagio and talked about the Gabors, who weary Old Pepys.

Jan. 9—In the evening to the Standard Club, where some 500 assembled for the annual meet-

(Continued on page A-172)

Capillary and Vascular Integrity

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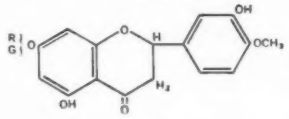

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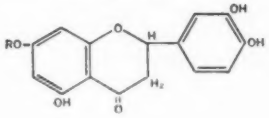

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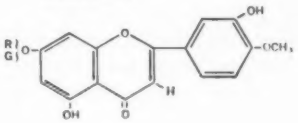

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ing of the Jewish Federation for Welfare. S. S. Hollander and Sam Goldsmith gave their reports; Eddie Eichengreen introduced old Pepys, who for a half-hour discussed old age, cancer, heart disease and accidents. And in particular Mistress Pepys, Irving Harris and Gidwitz found the comments entertaining. So drove home with Irv Altschuler, who is soon off for Florida.

Jan. 10—To visit Morton Baker, who viewed with his x-ray old Pepys' interior, and was anxious to observe the same myself since now more than a year has passed since the house cleaning and renovation.

Jan. 11—At the desk and attending to many editorial projects—all growing like mad. In the afternoon finished a Van Wyck Mason mystery of Colonel North called "The Golden Lily Affair," and then began a conglomerate mass of disordered diction and fantasy by James Jones, who wrote "From Here to Eternity." This begins like a Thomas Wolfe who is not sure that he wants to be Hemingway. In the evening to the Standard Club, where the Frieders had decorated the grill for a Hawaiian party.

Jan. 12—To the station to meet the Schildkrauts, who are en route from Milwaukee to Columbus—bag and baggage and two Chihuahaus—and with them to the Standard Club, where they rested and had luncheon. In the afternoon watched the Western pros defeat the Easterners, the difference being the manner in which the former intercepted the passes of the famous Eddie LeBaron. And until late kept on reading "Some Came Running," which seems without form but not wholly void.

Jan. 13—All this day desk-bound and finally finished the massive novel by skipping rapidly through the last 400 pages to find out how it ended, but really not caring.

Jan. 14—Early awake and by American Airlines a smooth flight to Los Angeles in five and a half hours. Here with Sam Soskin to the Brown Derby to dine and then to his lovely home in Beverly Hills, discussing the changing medical scene, climate, medical education and advances in endocrinology. During the flight writing, and reading a fine mystery by Coxe—"One Minute Past Eight"—and a novel of suspense dealing with escaped convicts in a Mississippi River flood.

Jan. 15—To breakfast came Stanley and Bob Henwood talking of new projects in New York and Palm Springs. Thereafter outlining an address. In the afternoon to visit the City of Hope, finding that a great change has occurred with new buildings and new orientation toward research. The pavilions formerly used for housing the tuberculous patients have now been equipped as laboratories. A well-organized staff of young men probe every phase of attack on unsolved disorders. So spent an hour with Dr. Howard R. Bierman, touring the laboratories and meeting the investigators. En route back to the hotel saw a baby-sitter service advertised as a "Baby Safety Service," and in the Mexican quarter a sign reading "La Chiquita Bakery and Mexicatessen." and how that last word would have delighted H. L. Mencken. In the evening came a fine young group to dine in the session of the Beverly Hills Academy of Medicine. Samuel Soskin presided. Old Pepys chatted with Melvin Sommer, cultured pathologist, the new president Vincent P. Burby, and met again Bob Portis and many former students and aging physicians who used to date Barbara and Marjorie. And Dr. Romm came up with this bon mot, "Love conquers but Oedipus wrecks."

Jan. 16—Flying back reading an intimate psychologic novel—"The Return of Lady Brace," by Nancy Ross, and another narcotics thriller by Glenn M. Barns which proves again that narcotics induce rape, murder, assault, larceny and, somehow, cleverness in mystifying the law, which makes good novels and bad science.

Jan. 17—All the day with the desk and the long-distance telephone, the latter having well-nigh replaced the telegraph. To dine with the Julian Levis, and what a magnificent job he has done with the rehabilitation of our area around the University. Here also the Philip Millers, Roy Fisher, who is now assistant city editor of the *Chicago Daily News*, Josephs, Mrs. Milton Reynolds, and the watchdog of the University finances, William Harrell. So the evening passed pleasantly with anecdotes and reminiscences of Henry Justin Smith, President Burton and the good old days of the '20s.

Jan. 18—More of the same interspersed with a two mile walk to stretch the muscles and burn the calories. At night to the Bath in the Ambassador where my old classmate Louis D. Smith entertained, dining sumptuously while talking about Europe. Then put my mathematics against that of several millionaires, and they were better than I was.

(Continued on page A-174)

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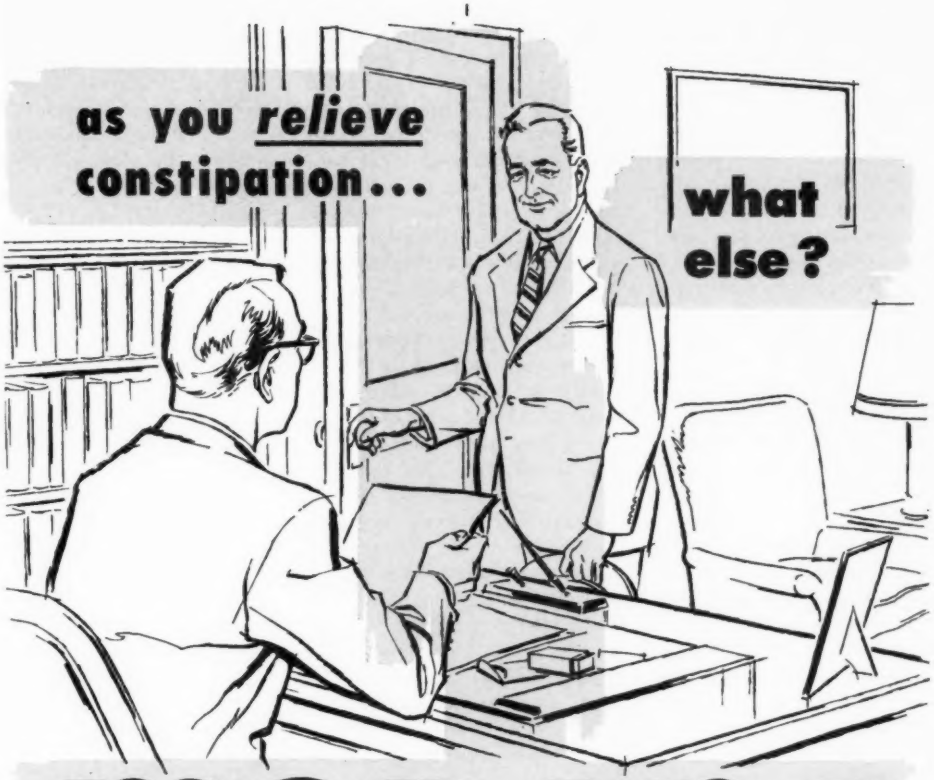

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Jan. 19—With the family and read "Anatomy of a Murder," by Robert Traver, and enjoyed every minute of it; particularly enjoyable were the direct and cross-examinations of the opposing psychiatrists—and informative too. Indeed, all the medical testimony associated with the rape and the murder was fascinating. The case takes place in northern Michigan, and the author is a justice of the supreme court of that state.

Jan. 20—Comes the snow, and remained indoors reading, writing and abstracting.

Jan. 21—At noon to the Sarah Siddons' Walk in the Ambassador, and here were all the ladies of the Variety Club Auxiliary and the officers of the men's club; old Pepys spoke of research on heart disease. In the evening Joe Kirsner and his lovely lady came to dine and brought old Pepys, for reading, the lives of Pavlova and Argentina. Thereafter in a great storm to speak at Sinai Temple Forum of new research to some hundreds who attended.

Jan. 22—At noon to the council of the research institute of Michael Reese, sitting with Dorothy Koff and Jay Herz. Here Josephson spoke of inherited blood disorders, and Gold talked of research on diabetes. In the evening for the benefit of the Alliance Française to a sold-out opera house where the great Callas sang divinely. Reporters and photographers swarmed like bees, expecting another volcanic eruption, but Callas was graciousness personified.

Jan. 23—At the desk and read "Kampong," which is a novel of a great battle against cholera but more particularly of the bitterness against the Dutch and all Caucasians in Indonesia. The medical facts and the tragedy of organisms' developing resistance to penicillin stand out starkly. In the evening to hear Carlo Giulini of Milan conduct the Chicago Symphony Orchestra with some startling Italian music and Tchaikovsky's second symphony.

Jan. 24—Aiding in designing a campaign for City of Hope with Morris Gordon. In the evening to Theodore Cornbleet's, where also were Madame Rosa Raisa, the Rolnicks, the Sam Pearlmans and others. So we watched Ed Murrow interview Callas, who had been eating honey that exuded from her every pore, and heard some singing of lovely spirituals.

Jan. 25—To walk for some exercise, watched basketball games, read Richard Wright's "White Man, Listen"—too bitter to be just—and Rex Stout's "If Death Ever Slept," which is his usual masterful performance with Nero Wolfe. In the afternoon came Otto Frank, father of Anne, who told of new developments with the Anne Frank Foundation.

Jan. 26—To Sinai Temple, hearing a great sermon by Rabbi Martin and a talk by Otto Frank, and altogether it was a unified service of which Louis Mann could be justly proud. Here also Professor Oppenheim, who devotes his life to Assyriology. So all came to lunch with the Winstons, Justin, Morris Friedell and the children, which made a great afternoon. In the evening to Herbert Byfield's and talked with Eliel, who developed College Inn Foods, and with a lady who knew the stock market inside out—and I wish I did.

Jan. 27—Reading many periodicals and particularly amused to read in an article by Szent-Gyorgi of an experience he had in submitting a manuscript dealing with the electric field in muscle physiology:

> I can illustrate how divergent the ideas in this field are by telling you that when we wrote our paper we sent it to *Science*, and I got the manuscript back saying that this is not new; Helmholtz knew it all. Then I sent the paper to the journal *Neurology*. They sent it back saying that it was so new they don't dare to print it. Then I sent it to the *Journal of Physiology*, and they sent it back asking whether it was a joke or a paper. So we published it in Chicago in a mathematical paper and since then, in England, Knudson has shown that all of our experiments were wrong.

At noon to the Chicago Heart Association to meet with Karl Meyer, Herbert Abrams, Louis Katz and Louis De Boer about a home care program. In the evening to the meeting of the Board of the Hektoen Institute at the University Club.

From Cali in Colombia comes an interesting statement by Dr. Ernest Carroll Faust:

> Over the week end I have thoroughly enjoyed reading the 1957 edition of "Dr. Pepys' Pages." For a person a year older than myself (and also a Missourian), you are certainly "hardy." I would use the term "durable."
>
> There are so many of my friends whom you mention that your diary reads almost like a personal account. You may remember that I traveled in Germany four years ago with our mutual long-time friend Ernest Irons.
>
> My work here in Colombia is both interesting and, I hope, profitable. I function as resident consultant and coordinator for Tulane's Program in Medical Education in the seven medical schools of this country. In addition, consultants in special medical disciplines come from Tulane for three months' periods in these medical schools. There

(Continued on page A-176)

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is definite evidence of marked improvement in some of these medical faculties, particularly here in Cali and in Medellín. However, three other schools are now in the process of awakening, the National University in Bogotá and the medical schools in Cartagena and Manizales. In the National University the difficulty has been twofold, loyalty to the old French system and change in administration several times a year, but there is now a desire for integration with American methods.

I have also found Colombia to be a paradise for my own field of professional training, wide-open for investigation. I am training young physicians in the problems of parasitology and tropical diseases.

Jan. 28—By plane to New York, reading en route the medical periodicals. In the afternoon visits from Margaret Eagan and Mrs. Smith of the Van Riper clan. Then in the evening the Lasdons came to dine.

Jan. 29—For conference with Bud Gruber and Dr. Parmele; at noon to luncheon with Milton Runyon at Romeo Salta's, where the *minestrone* and *fettucine* are as good as Alfredo's. Conferring with Ralph Beebe and Jo Marks and thereafter with Russ McDonnell at Warwick & Legler. Next dining with Tom and Terese Rivers and all to see Ralph Bellamy and Miss Fickett and others in a preview of "Sunrise at Campobello," the great story of Roosevelt's attack of infantile paralysis. Here met Dore Schary, who wrote the play, which is a great and inspiring drama of an unconquerable spirit full of humor and humanity; but Franklin Roosevelt's mother comes off badly in this play. Indeed, in the drama this is a bad year for mothers, with such plays as this one, "The Rope Dancers" and "Look Homeward, Angel."

Jan. 30—At the desk working with copy for my new book and to luncheon with Mistress Pepys. In the afternoon come Mel Evans and Joe Schildkraut's physician, Dr. Gertler. To dine then in the Grand Ballroom of the Waldorf, sitting with Bob Bennett of Warm Springs and chatting with the charming Mistress Bennett and with Terese Rivers on the other side. Greeted Ralph Bunche and the Howard Rusks, the Cottons, Joe Smadel, Jonas Salk, the Dietzes and many more. Also Hazel O'Connor asked old Pepys to tell a story to John Daly of "What's My Line," and this is really coals to Newcastle. On our entrance met by Dick and Edith Barstow, who staged a great show with Lillian Gish, Don Ameche, Rudy Vallee, Madame Thebom of the Metropolitan, Bambi Linn, and Peggy Lee.

Jan. 31—To breakfast Stan Henwood, and then driving with Bill Lasdon out to Morris Plains for a day of talks with Elmer Bobst, Al Driscoll, Fossel, Len Scheele, Paul Robinson and others at Warner-Lambert. On Elmer's desk was "The Notebook of Leonardo da Vinci," which old Pepys gave him for a birthday in 1938. With this Elmer was concocting some of his inimitable correspondence. In the evening to dine at Lindy's with Mark and Rose Soroko on corned beef and lotkes. In the *British Medical Journal* observed two new abbreviations—A.I.D. and A.I.H.—the former meaning artificial insemination from donor, the latter from husband, and a queer coincidence that insemination from donor comes out "aid."

Feb. 1—In the morning for conversations with Justus Schifferes about publishing and Ed Stegen about brain research. To lunch came Irene Lowry, number two girl Friday who is now employed in Montclair. In the afternoon strolling with Mistress Pepys to Tiffany's, seeing wonderful treasures of glass and china and adding to a collection that already overflows. In the evening to dine in an Epicurean fashion at the Little Club, and then to see "Look Homeward, Angel," seeing there Eric Leinsdorf and his lady with the George Mareks, also Bill Frohlich, the Basil O'Connors and Bennetts. The play is a jewel with a perfect mood, humor, intensity and the complete absorption which is the hallmark of great theater.

Feb. 2—For a fine day walking about the city and in the evening to dine with Herbie and Grace Mayes and Alex in their apartment, and here came also Milton Biow and he told us most wonderful tales of his trip to Vietnam and China and he seemed enthusiastic indeed about the Chinese damsels.

Feb. 3—Early came Joe Mandell to speak of the program for the Columbia University School of Pharmacy. Then Howard Rusk, Mary Switzer, Dr. Herman, Peter Warren and Jack Taylor, and great discussions ensued relative to the new section of *Excerpta Medica* which will deal with rehabilitation. In the afternoon among the shops and bookstores and in the evening with Mary and Anastasia Switzer to a new restaurant called The Forum, the restaurant of the Twelve Caesars, one of the most gorgeously decorated and fascinating emporiums of food to be found in New York City. The menu is an Epicurean delight. Thereafter to the greatest musical show of the season called "The Music Man," which is full of magnificent dancing, sentiment and humor.